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West Europe Report

SCIENCE AND TECHNOLOGY

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WEST EUROPE REPORT

SCIENCE AND TECHNOLOGY

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ADVANCED MATERIALS

FRENCH FIRM ACQUIRES U.S. TECHNOLOGY FOR JET ENGINE COMPOSITES

Paris L'USINE NOUVELLE in French 15 Dec 83 Supplement pp 22-24

[Article by Pierre Laperrousaz: "Production--Hispano-Suiza: Composite Parts 'Made in France'"]

> [Text] It took only seven months for Hispano-Suiza to convert to bonding and to produce itself the bonded metallic panels of jet engine thrust reversers, which it used to import from the United States. Made confident by this first experiment, the company is now embarking on the production of organic-matrix composites.

Le Havre (76) The rise of the dollar has had one positive effect for Hispano-Suiza: the company has acquired a new bonding technology used in manufacturing composite panels for the thrust reversers of the CFM-56 jet engine. Since 1977, when Hispano-Suiza started manufacturing these reversers for its parent company SNECMA [National Aircraft Engine Study and Manufacturing Company], the "green bill" has more than doubled. And the cost of composite panels imported from the United States has become prohibitive. As a result, already in 1982, Hispano-Suiza considered "repatriating" production to its Le Havre plant where the reversers are manufactured. It took the company only seven months to get the equipment and the knowhow, and it produced its first set of bonded panels last July. "Late in October, we had already manufactured seven sets of panels and we expect to produce nine sets per month by next June," we were told by Henri Malvault, head of the reverser production department.

Each set consists of six panels, and each panel consists of a honeycomb sandwich with light-alloy facings. The most complex panel still requires 10-11 workhours for a skilled worker! Actually, the production rate is not limited by the manufacturing time, which is expected to improve, but rather by the reduction in aeronautical programs. "At first, we expected a monthly production of 40 reversers; actually, we never exceeded 15. In 1983, we shall have to make do with nine," according to Henri Malvault. The present manufacturing program involves new CMF-56-2 engines for the DC8 (the 110 airplanes will require 530 thrust reversers, 265 of which had been shipped by late October) and engines for the U.S. Navy E6A airplanes (the military version of the 707, to be used for telecommunications with nuclear submarines), i.e. 60 reversers for 13 airplanes. Apart from that, all Hispano-Suiza has is expectations: will the U.S.

Air Force use thrust reversers on the KC-135 which it already started to equip with new CFM-56 engines? Will the A-320, which is supposed to be equipped with CFM-56 engines, actually be manufactured?... For the latter aircraft, at any rate, Hispano-Suiza has already designed two thrust reversers, based on two different principles.

The decline in production rates has at least made it easier to implement the new technology: "We were able to get ahead of our delivery schedule and thus free a seven-month period to implement the new production tools and train our personnel," the department head told us. Late in 1982, consultations began for the procurement of a scouring line and an autoclave. With drastic conditions: a one-percent penalty, with no set maximum, per day late. "We could not afford to stop jet-engine production," Henri Malvault explained. Despite this, two suppliers offered their services: Scholtz, a German enterprise, for the autoclave, and Provalga, a French small to medium-size enterprise, for the scouring line. They delivered on time, and the German company even had to be prevented from delivering ahead of schedule! The total investment for the scouring line, the epoxy-sizing line, the white room for bonding, the autoclave and control equipment amounted to 15 million francs, and an equivalent amount was spent to implement industrial production and train the personnel.

The latter part of the program was also affected by the decline in production rates. "Initially, we had planned to hire new unskilled labor, specially women because of their aptitude for painstaking work, and we would have trained them," we were told by Jean Treger, head of the composites workshop. Actually, they had to transfer skilled personnel from other workshops where declining workloads no longer provided work for all. "We forced no one," Jean Treger stated. It is true that some refused to be transferred to bonding, which is considered dirty work. It is equally true that those who accepted, like Christian Poilpot and Michel Barrey, who now work on the final assembly of the panels, understood quite well that they had little choice! "This is where work was still to be had, and we are lucky that we ended up liking it," they said. They retained their original job rating (P1) in their new positions. But people at Hispano-Suiza are fully aware that nearly everything remains to be done with respect to the rating of these "new" jobs: "For instance, what kind of tests should be required to go from one job rating to the next?" Henri Malvault asked. "Anyhow," he added, "our personnel manager is in Nantes this very day, discussing this with his counterpart at SNIAS [National Industrial Aerospace Co. (Aerospatiale)].

A Way to Save Time

A good loser, the U.S. supplier of bonded panels, Martin Marietta from Baltimore, provided training for the personnel. However, Hispano-Suiza had to pay a large amount, in dollars, and it prefers not to reveal the exact amount (besides, the panels represent only 20 percent of a reverser cost and are only a marginal operation at Martin Marietta). "We could not afford to miss our entrance on the composites market. Our credibility was at stake," Henri Malvault explained. "Not only did we save time that way, but we also could see what could be done, and we were able to set realistic objectives for ourselves from the start. And the Americans showed us that the most complex panel could be assembled in one day."

The tools--which belonged to Hispano-Suiza--were therefore repatriated, and Martin Marietta sent one supervisor and one operator to spend five weeks at Le Havre to manufacture the first set of panels. While they were making one panel, the French were simultaneously assembling the symmetrical panel on the second set of tools (each thrust reverser consists of three left and three right panels). All manufacturing sequences were videorecorded: "This is the best way not to overlook anything, especially since not everything was listed in the assembly schedules supplied by the U.S. manufacturer."

Greater Control Over Manufacturing

Today, the workers go back to this videorecording whenever they have "a lapse of memory." They still require 10-11 hours to assemble the movable outer panel--the most complex--compared to 6 hours for their U.S. counterparts. "But they make only one type of panel each, while we must know how to make all three types," Michel Barrey pointed out. And then, each U.S. technician has already made at least 400 panels! After a few months and 7 sets of panels, appreciable progress has been made: the movable inner panel is manufactured in 7 hours instead of 14.

These first attempts at bonding will be continued at Hispano-Suiza, and composites, including organic-matrix composites, will be used more extensively in thrust reversers. At least, they are expected to; a lot hangs on the fate of the A-320. Carbon-fiber and honeycomb composite parts will soon be produced by the Le Havre workshop under an experimental program concerning the A-320 aircraft. "By considering the use of composites from the designing stage, we can reduce the reverser weight by 20-25 percent," Jean Treger stated. "In the meanwhile, we are practising on composite flaps for the CFM-56 reverser, deflection flanges, air scoops, etc."

From Honeycomb... To Quality Control

At its Le Havre plant, Hispano-Suiza is assembling the thrust reversers for the CFM-56 engines from components subcontracted to other enterprises and components manufactured on location, including the bonded panels forming the movable part. There are six panels, in symmetrical pairs. Each panel has a sandwich structure: an aluminum honeycomb core and light-alloy "skins" or facings. On three of the panels, one of the skins is made of perforated metal, which requires some precautions during bonding, as the perforations must not get clogged.

The panel components are first scoured, using trichlorethylene for the honeycomb and an alcaline detergent for the facings; they are then rinsed and dried in an oven. An epoxy primer is then applied only to the perforated sheets. Then, the panel components are transferred to the white room where bonding takes place. Then, the bonding operation is carried out. An adhesive film is applied on the surface of the preheated non-perforated metal sheets. The film, which is stored at 4°C in a cold room, is kept between a protective sheet of paper and a sheet of plastic. When it is deposited on the part, the paper is removed but the plastic is left to protect the adhesive until final assembly. In the case of perforated panels, the adhesive is deposited on the honeycomb instead of on the facing. Then, a special operation called "reticulation" is carried out: after the adhesive film has been deposited on the honeycomb and perforated at regular

intervals by a pass over a "nail board," the assembly is heated with an infrared radiation that causes the film to shrink over the honeycomb cell section.

The various panel components are then placed in the corresponding tools. Expansible adhesive joints bond the honeycomb section and the edges of the panel. The assembly is covered with an airtight plastic film in which a vacuum is made, and then introduced into the autoclave (3 m in diameter and 6 m in length) under a pressure of 2.7 bars and a temperature of 177°C. During curing, the vacuum is maintained, which, together with the autoclave pressure, ensures that the components are pressed against one another. A batch of control samples is included with the part.

All the panels are then checked by X-ray and by the "tap test," the American name for a test which involves tapping manually the whole surface of the panel to detect any bonding defect by ear.

9294
CSO: 3698/236

BRIEFS

ENERGY INDUSTRY COMPOSITE MATERIALS--The French Petroleum Institute, the National Industrial Aerospace Company, Hercules Incorporated and Vetco Offshore Inc., a subsidiary of Combustion Engineering, have just signed an agreement to develop structural elements made of "advanced composite materials" to be used in the oil and gas industry. Another objective of the association will be to define and carry out industrial programs to develop new materials that could be used for applications, at sea and on land, where light weight, corrosion resistance and ease of design are essential. During the past three years, the French Petroleum Institute and the National Industrial Aerospace Company have manufactured and tested systematically and successfully prototype tubes made of "advanced composite materials" and intended for marine and land applications. [Text] [Paris INDUSTRIES ET TECHNIQUES in French 20 Nov 83 p 140] 9294

CSO: 3698/246

MATRA'S COMMERCIAL SPINNOFS FROM SPACE PROGRAM ACTIVITIES

Paris ELECTRONIQUE ACTUALITES 9 Dec 83 p 10

[Article by H. Pradenc: "Matra creates a data processing department for space applications."]

> [Text] Within the Spacelab European Consortium, Matra has been given th responsibility in 1974 by ESA (European Space Agency) and NASA, to develop and implement the hardware and software for the CDMS (Command Data Management System) European Space Laboratory on-board system. The job consisted of developing the largest piece of solfware for the 28 Nov to 8 Dec flight, except for the software used for the shuttle itself.

This contract enabled the French company to acquire a level of know-how which would not have been imaginable 10 years previously, and which became a reality, mainly through the creation of a specialized data processing department. This activity opens up a new range of possibilities for the company in its participation in future European space programs. We have in mind Eureca, the European Retrievable Automatic Platform scheduled to be placed in orbit in 1987.

The CDMS system was used to process and manage all the data necessary for the spacelab subsystems and the experiments. It handled the on-board storage and processing of data, transmission of raw and processed data to ground stations, time distribution. three-way radio communications (spacelab, shuttle, ground), and the man-machine interfere, using a keyboard and display. To achieve this, Matra had to develop a modular configurable system for each type of mission, with an adaptable universal software.

The data processing department, set up in Velizy, is handling this development. With its own hardware (Intel Micro 8086 and Texas Instruments 16 bits), and with a link to the group's information center equipped with Vax 780 and Gould Concept 32, it is capable of developing on-board information processing space systems requiring a level of miniaturization and processing power compatible with the amount of data involved. This center will be used to develop the software for automatic platforms which require more elaborate programs than manned satellites. Matra Company may also use it to develop the software for small satellites or for aircraft, particularly for photographic reconnaissance and cartography.

Service Bays

A commercial spinoff related to the development of the spacelab brain has been the marketing by Matra, of service bays, ground systems for the development of hardware compatible with CDMS, and ordered by US and some European businesses and universities. This activity is anticipated to reach a certain level of importance with the development of new space experiments and of subsystems to communicate with the shuttle.

CDMS was designed as a centralized subsystem under the control of two processors: one for Spacelab's subsystems, and one for the experiments. It communicates with the peripherals (including the shuttle) through two 1-Megabit data busses. It includes data processing activities (DPA), a high speed subsystem (HRDA), and an audio intercomm for voice communications between crew members and the ground through the shuttle. CDMS may be installed in a module (as in the case of the Spacelab mission), or in the section named "Igloo" in the case of configurations with a single pallet.

134 Megabit mass storage

Each DPA subsystem includes a computer, an input device designed by Matra, a backup computer and two or three color displays, and shares 134 Megabits of storage. The input/output device is of the decentralized type where the dialogue with the peripherals is handled by a specialized and redundant adapter. Random access viewers (RAV) handle the interface with the subsystems and the experiments. They total a maximum of 22 in both cases and include 128 flexible analog or digital inputs and 64 binary commands. All the RAV units are connected to the input/output devices through two redundant data busses routed throughout Spacelab (module and palet).

The HRDA includes a multiplexor and a recorder, both operating at high frequency to transmit data from the experiments to the ground at 48 Megabits/sec through the shuttle and the TDRS relay satellite.

Before the end of 1984, Matra will have delivered 4 CDMS systems installed in modules and igloos and two spare sets. An initial contract for two units, amounting to FF 550 million was signed with ESA. The second contract, with NASA, was for an amount of FF 200 million. With this second contract, Matra began its volume production. Furthermore, the company is supposed to deliver ground versions of the CDMS package for use in simulators, each amounting to about FF 15 million.

The Eureca program

A new European space program to succeed Spacelab is currently being defined. It is the Retrievable Automatic Platform Eureca where Matra is particularly involved in data processing, attitude and orbit control, transfer vehicle studies, remote handling and robotics, as well as navigation for an earth-return module. Eureca will allow the scheduling of 6 to 8 months missions (as opposed to 7 to 11 days for Spacelab) and, since it will be unmanned, will allow a residual gravity of 10^{-5} g to carry out experiments.

Placed by the space shuttle on low 250 km orbit, Eureca will climb to its 500 to 600 km operational orbit on its own and will come back down to the low orbit at the end of the mission to be recovered. The first mission is mainly centered on microgravity experiments. The following missions will be used to develop the technologies required for the future large-scale space platforms, such as rendez-vous, docking, remote handling, and robotics.

6445
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AEROSPACE TECHNOLOGY USED IN FRENCH FUEL-EFFICIENT-CAR STUDY

Paris REVUE AEROSPATIALE in English Dec 83-Jan 84 p 29

[Article: "Streamlining Plus Composites"]

[Text] This could be the car of tomorrow, according to a conceptual study by the Aerospatiale company undertaken at the request of the ministries of industry and transport. And it might be Mr Everybody's car if the government were to go ahead with the project.

Submitted for the first time before a meeting of the 'Société des Ingénieurs de l'Automobile — SIA' (Society of Automobile Engineers) on October 12 last, the feasibility study ordered by the government in 1981 concerning a super fuel-efficient car could open up the way for the use of aerospace technology in the French auto industry.

Aérospatiale's Helicopter Division has teamed up with three other companies to form a study group (Moteur Moderne for engine design, Sera CD for the aerodynamic studies, and Valeo for the transmission, cooling and electrical systems). The result, a vehicle which meets the government specifications, has nothing revolutionary about it at first sight. And yet it foreshadows the car of tomorrow: extremely low fuel consumption (3 liters per 100 km on average), full compliance with the safety norms in force in the 1990s (thanks to aerospace spinoff), high speed and acceleration, an onboard computer similar to those on aircraft, etc.

A full year of testing (from May 1981 to May 1982) and extensive use of computer-aided design (CAD) ultimately led to engineering decisions that exceed the original specifications laid down by the ministries concerned.

So how did this group of four manufacturers manage to obtain results that surpass the expectations even of the car manufacters themselves?

Through the use of composite materials lighter and stronger than metals, resulting in a 50 % weight saving by reducing the power needed to overcome air resistance and achieving a coefficient of drag (Cx) of 0.20 (as opposed to 0.4 on most modern cars); by reducing the rolling resistance of the tires by cutting vehicle weight and reducing the friction coefficient of the tires themselves, and by using an extremely light supercharged engine featuring a novel adaptive engine lubrication system.

In short, by using techniques familiar to aerospace engineers.

But what about the price of such a car? In all likelihood, not more than 20 % more than that of a current medium-sized model such as the Citroën GS, the Renault R14 or the Peugeot 305, thanks to automated manufacturing methods. Well worth waiting for!

Technical Results

	Target Figures	Actual Figures
Empty weight	500 kg	489 kg
Maximum weight		870 kg
PERFORMANCE:		
Maximum speed		180 kph
Standing start (400 m)		20.5 sec
Standing start (1000 m)		37 sec
FUEL CONSUMPTION PER 100 KM:		
Urban cycle (UTAC)	2.82 liters	
90 kph		2.26 liters
120 kph		3.23 liters
Average	3 liters	2.77 liters
MAXIMUM RANGE:		
With 20-liter tank	650 km	

CSO: 3698/242

CIVIL AVIATION

FINANCIAL STRUCTURE, FUNDING FOR AIRBUS INDUSTRIE

Zurich NEUE ZUERCHER ZEITUNG in German 1-] Jan 84 pp 9-10

[Article by Gerhard Schwarz: "A Model of European Cooperation? Airbus Industrie in the Maelstrom of Aviation Problems"]

[Text] This appropriately named airplane is known to many. Behind it stands a company which to those who have an interest in it is regarded as a model of European industrial cooperation: Airbus Industrie.

Its present situation is anything but rosy, however, the aircraft industry thinks for the longterm. In any case, it is too early to announce the demise of Airbus.

Paris, December. During the early 1960's, various European aircraft manufacturers had undertaken projects which were intended to lead to an airplane with high seating capacity for short to medium range trips. The knowledge that this would exceed the capabilities of the individual companies led to an initial agreement between the French, German and British industries, wherein an airframe manufacturer and an engine builder from each of the countries were represented. The project name A-300 designated the approximate seating capacity; and with the trade name Airbus was coupled the idea of making the airplane a genuine mass-transportation medium stripped of luxurious trappings. Since the British Government and Rolls-Royce withdrew from the project, the only remaining partners were France's Sud-Aviation and German Airbus--the latter composed of German firms--who on 29 May, 1969 signed an appropriate agreement for launching the A-300B equipped with General Electric engines. At the end of 1970, Airbus Industrie was legally established and the Dutch firm Fokker was signed up as an associate member. One year later, the Spanish firm Casa became a full member. In 1979 British Aerospace joined as a full member along with Belgian Industries (organized under Belairbus) as an associate partner for the A-310 program.

Low Economic Transparence and Government Interests

Its legal structure makes it extremely difficult to see through Airbus Industrie. It is neither a public corporation nor a limited corporation but rather a Groupement d'interets economiques [GIE Association of Economic Interests], a

a French business structure which was only created in 1967. The GIE represents a type of consortium with its own legal personality. It can only be involved in activities in which the partners were previously engaged; and it is not profit oriented in its own right. The GIE is supposed to increase the profitability and income of the partners. Thus an annual balance sheet is not published since all costs and earnings are consolidated with the partners and merely flow through Airbus Industrie. Only indirect taxes are levied on the GIE; direct taxes are levied on the partners by the national taxing authorities. Only to the partners is the Airbus company to some degree economically conceivable, apparently a not unwelcome situation in a market which as a rule is distorted by all sorts of subsidies.

Airbus Industrie is under strong governmental influence because of the way its shares are distributed. Of the two main partners--to each of which 37.9 percent of the rights and obligations fall--the French SNIAS (National Association of Aerospace Industries), the successor company to Sud-Aviation, is 97 percent government owned. The German Airbus GmbH, which has been a full subsidiary of Messerschmitt-Boelkow-Blohm (MBBO since VFW (United Aeronautics Industries) fused with the latter, is the only really private company of the Airbus group. The Construcciones Aeronauticas S. A., whose participation is 4.2 percent, is completely owned by the Spanish Government; and British Aerospace is owned by the British Government and private investors, each holding about 48 percent, leading to a situation in which the employees tip the scales.

Production All Across Europe

The first flight of the A-300 took place on 28 October 1972; certification followed in March 1974, and the first passengers flew in May 1974. The production methods which made possible this relatively fast development to production maturity are about as unusual as the organization itself. The work is parcelled out in a rational manner but not the costs. A production line was set up cutting straight across all partner factories. In Toulouse, at the head office, only final assembly takes place, about 4 percent of the total work according to Airbus information. Thus, only about 1,000 people are employed at Toulouse with 600 of these being specialists on detached duty from partner factories. Super Guppy transport aircraft carry the individual elements from one location to another and finally from the assembly centers in Bremen, Chester, Hamburg, Madrid and St Nazaire to Toulouse for final assembly. The airplane is then taken to Hamburg for installation of interior furnishings and finally back to Toulouse for acceptance and delivery. What appears to the layman as a great deal of shuttling back and forth is not considered by Airbus as excessively expensive. To the contrary: no airplane in the world is built at one location since a company often has several factories of its own and also contracts work out to subcontractors. Also, distances in Europe are relatively short, and air transportation causes little damage and is fast enough to limit production delays to a maximum of 48 hours.

Profitable or Not?

Airbus financing follows the pattern prescribed for the GIE structure. Each partner assumes his share of the research and development costs and daily

operating costs; the costs in Toulouse are charged to an annual budget in proportion to the work done by the individual partners; and the production is accomplished through a division of labor. Now, a widebody airplane is an expensive item of course--the development costs of the A-300/310 family has been estimated at about $2 billion--and the industrial partners are not in the position to fully finance this huge sum. Thus the associated governments have had to share the load. In Germany alone the government had to provide about DM 2 billion in anticipatory financing. Of course, this has to be progressively repaid as airplanes are sold--about $3 million per airplane. From the German side about DM 100 million has been paid back to date; however, an impasse has now been reached in that new credit would have to be opened to make these repayments. In the start up phase of Airbus there were some very real production subsidies in the neighborhood of DM 500 million, support guarantees for outside financing of over DM 4 billion and a credit line of DM 2 billion for sales financing, of which only a small part (DM 300 million) has been used.

Whereas from the American side this last item in particular is attacked as a subsidy, Airbus justifies it on the basis of Export-Import Bank practices--tit for tat. The other countries participating in the Airbus project, especially France, see the financing in about the same light. In any case, the responsible officials are not bothered by details of tedious propriety and some strong arguments cannot be easily brushed aside: civil aviation [in America] is supported by the government through procurement for the armed forces, for Boeing for example; an independent European aircraft industry is of central importance and high value and finally aircraft manufacturing pays off only in the long term. In the opinion of experts, it is possible that even such successful airplanes as the Boeing 747 and DC-10 have not yet paid for their development costs.

An Incomplete Product Line

Whether there were actual subsidies in the anticipatory financing on the European side will only be demonstrated in the mid-1990's when the specified break-even point should have been reached at the latest with the sale of about 800 airplanes. Indeed, according to !irbus data in 1981 and 1982, they could control more than half of the wide-body market at any time and toward this have provided about 25 percent of the total inventory of this type of airplane; yet until now only 352 firm orders have been received from 46 customers. In addition there are probably about 100 options on the books. Since about 232 machines have been delivered, there are only 120 units left on the order books. This backlog will last for 20 months if one assumes the originally projected rate of 6 machines per month. But sales have clearly slacked off. The number of firm orders increased last year by just 6 machines and this year by an additional 8. The Japan Airlines order fell through, and Quantas and Egyptair chose Boeing. Thus, for the time being, the rate has been slowed to less than 5 units per month and jext year will even go to about 4.3 units. Five units will about balance demand. The partner factories, for instance SNIAS, where Airbus accounts for about 18 percent of sales, had to work short hours over Christmas. Granted, there is the danger that Airbus will not be ready to deliver with a firming up of demand which all in the industry are expecting;

but conversely, the possibly 18 aircraft on inventory at the end of the year with a value of about $1 billion will add greatly to the cost of financing. At Airbus headquarters people still remember the experience of the 1970's when under pressure mainly from the Germans they proceeded somewhat slower than sales justified and the delivery schedule became a handicap.

People at Airbus believe that the crisis which is impacting the aircraft industry worldwide can only be combatted by each company expanding its product line downward. Meanwhile, the development costs for the smaller Airbus A-320 with about 150 seats will presumably amount to an additional $2 billion just for the airframe and an estimated $1.5 billion for the power plant. And that means that even in the mo-t optimistic scenario, the taxpayers will be asked to provide the anticipatory financing. With the terse formulation that she does not want a "second Concorde," Margaret Thatcher has probably most sharply expressed the widespread skepticism over this new "adventure."

Indeed, the optimism of Airbus Industrie does not rest on such solid ground as they legitimately try to present. True, it appears plausible that the market for aircraft of the A-3-0/310 types will firm up again; and with the announced partial withdrawal of McDonnel-Douglas from transport aircraft development, it appears that the Airbus producers will become right in one point, namely that in the future the market will only have room for two competitors and that Airbus Industries will be one of these. Also, synergistic considerations such as maintenance certainly play a role in the purchasing decisions of many airlines and is a point in favor of Boeing which is the only company in the position to supply the total spectrum of airplane types required by a modern fleet. Conversely, the building-block system also brings advantages to production. And finally there is a real trend back to somewhat smaller airplanes.

But until now only the two nationalizedFrench airlines Air France and Air Inter, the private British Caledonian airline and the Yugoslavs have shown an interest in the A-320 which is still on the drawing board and expressed 47 firm orders and 41 options. With many airlines in the close geographic area of Airbus Industrie, Lufthansa for example, a fleet renewal is not due before the beginning of the 1990's. Thus, the cat is chasing its tail: the demand is not yet manifest but within a few years may, however, be solidly present. In order to be ready for this eventuality, the A-320 program would have to be undertaken as quickly as possible. The early decision of British Airways in favor of an American airplane, which in France stirred anger over lack of solidarity, may be related, among other things, to the fact that the American model already exists while the A-320 is still a paper airplane. The government providers of financial aid, especially in Germany and Great Britain, would very much like a clear signal that the company really is in the right market.

More a Social-Economic Than an Industrial-Economic Undertaking

Presumably, however, the rather French way of thinking, wherein the create a show of harmony in the Airbus Consortium while always opposing the German viewpoint and are never reluctant to claim Airbus Industrie with its French president Lathiere as their own, is more honest and appropriate. To their way of

thinking, airplane building is an indispensible key and leading industry. Only Europeans and Americans--and not even the Japanese--have the required know-how which under no circumstances can be allowed to go to waste. Continuing in this vein, to allow an American supplier to monopolize a market is the same as giving up a European trump. Airbus public relations campaigns always play up the socioeconomic utility of the European concern. The six firm which participate directly in the project as partners or associates oper-67 plants, registered sales of more than $10 billion, and employed 180,000 people in 1981. Within the six companies, Airbus production provides work for about 23,000 people, and in addition many suppliers--1,400 in 17 countries including 475 in the United States and 12 in the Swiss economic zone--are indebted to Airbus for many jobs. Further, Airbus points out that European airplanes earned a foreign-exchange surplus of $3.9 billion and prevented the outflow of another $1.2 billion between 1977 and 1982.

Within the framework of such thinking, the question of costs does not appear to be a legitimate question. In any case, the Airbus builders have of course a powerful argument on their side: the industrial-economic success of the company, which in a market economy must in the end also provide the standard for the economic utility, can only be measured over a period of many years. Until such time, a great deal of patience and money will be required if Airbus Industrie is to have the opportunity to prove whether it is right or wrong.

9160
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FRANCE CONTEMPLATES ENTERING U.S. SOFTWARE MARKET

Paris TEMPS REEL in French 10-13 Nov 83 pp 6-7

[Article by Eric Seyden: "The Uncertain Future of French Software Packages in the United States"]

[Text] The software package market is now said to be one of the most promising sectors of the data-processing industry. France, which ranks second worldwide when it comes to software packages, is therefore confident that it can take a substantial share of this tempting pie. The recent U.S. tour of Edith Cresson, the minister of foreign trade, therefore gave the SFCE (French Foreign Trade Center) an opportunity to organize a one-day seminar on the U.S. market for software packages.

A key factor in the future development of the data-processing industry, French software is a close reflection of the domestic market. But our domestic market is very different from the U.S. market.

U.S. Influence

The French software industry will have to make a considerable effort to adapt its production to the U.S. market if it wants to sell it over there. But such an effort would be beneficial in more than one respect. When it comes to software packages, translating a product into a foreign language is a first step toward its "internationalization": the editorial rigor and formalism required (for the display messages and the manuals) will make the translator's work easier and, on the other hand, force the author to write the initial document clearly and explicitly. If a software package is to be sold worldwide, it must also be portable. Moreover, these two factors are all the more characteristic of the changes required of the software industry as the latter produces mainly specialized software which does not exactly meet these two criteria. The problems resulting from this situation are well known. To a large extent, they hinder the sale of French data-processing products, although these have earned a reputation for their overall quality.

Considering the influence which the United States usually have on other industrial countries, we can expect that the conditions prevailing on the U.S. software market will be reflected to a large extent on other markets (Europe, Japan, etc.) in the next five years. Now, the U.S. market for software packages, which

represented sales of 7 billion dollars in 1982, is expected to reach 29 billion dollars in 1985, corresponding to an average annual growth of 38 percent.

These figures show what is at stake in the U.S. market, and we can understand that the CFCE encourages French software houses to get as large a share of it as possible, especially when we are told that at the same time (1982), the French market for software packages represented 2.8 billion francs, i.e. 400 million dollars (if 1 dollar = 6.5 francs).

Other characteristic values are given by the breakdown of the market between equipment manufacturers and software houses. In 1980, 36 percent of the U.S. market belonged to manufacturers (including 20 percent to IBM, representing 3.8 percent of its sales) and 64 percent to software houses. Estimates for 1985 give 43 percent to manufacturers and 57 percent to software houses. Compared with these figures, in France and in 1982, manufacturers accounted for 78 percent of all software package sales.

Differences in Software Houses

But this is not the only discrepancy between the French and the U.S. software markets; actually, according to the CFCE, U.S. software houses do not operate in the same way as their French counterparts: they usually specialize in one type of service, while French software houses are often more diversified. Thus, we first have large companies, most of whose sales come from what the Americans would call large accounts (administrations, etc.). Then come engineering consultants who essentially bill their clients for the time spent plus costs and expenses (this market is also expanding in the United States). And finally three types of software houses specializing respectively in systems packages, application packages and turnkey systems. To this list we should also add the companies specialized in microcomputer software packages.

This summary illustrates the specialization of U.S. software houses, which can be expected to be tough competitors for their French counterparts. Especially since, at sales level, the U.S. market also offers other characteristics that should be taken into account. Indeed, distribution is becoming increasingly important in this sector, as it is progressively turning into an industry. Several middlemen are involved at this stage. First of all, the publisher who edits and checks the program submitted by the author, edits the manual, and finally publishes and sells the software package.

Retailers and Direct Sales

Since the beginning of 1983, the number of U.S. publishers must have virtually tripled. This trend is an indication of the vital role that publishers will play in the future. It underlies the strategies of companies such as Microsoft, Visicorp, Micropro, and others specializing in microcomputer software packages, who let independent authors design programs and essentially take care of the "packaging" (the French Academy has not yet approved the [French equivalent] word "progicielisation") and distribution. Two other marketing methods are also commonly used, through retailers and through direct sales. The latter, accounting for 40 percent of all software package sales, are made through ads in computer magazines. One last factor completes this marketing strategy: aggressiveness

in marketing and distribution. Indeed, the marketing policy of most companies intent on imposing their products consists in outbidding one another in every respect.

Other Promising Markets

This brief overview of the U.S. market for software packages shows what basic factors should underlie a marketing strategy aimed at conquering the U.S. market, and it also reveals the major deficiencies of the French software industry. However, although the United States are an especially interesting ground for an attempt at marketing software packages worldwide, there are other promising markets, countries like Japan which are still the nearly exclusive preserve of U.S. manufacturers and software houses. As far as the CFCE's advice is concerned, we may wonder whether it is necessary to go and confront on their own ground competitors whose means far exceed those of the French industry. Certainly, U.S. users have nothing against foreign products, as long as they are better and cheaper than the local production. The automobile industry is a very good example of this. But will the French software industries have the means to adapt rapidly? Of course, the government could give them the means to do so, but it seems to prefer spending its money to help the national manufacturer get back on its feet rather than to help an advanced industry round a cape that is vital for its future. However, the CFCE insists on the importance of the U.S. market and says it is ready to talk to all those who are interested and possibly give them substantial financial aid.

9294
CSO: 3698/246

BRIEFS

NEW BULL MINICOMPUTER MODELS--Bull, the leading French computer manufacturer, launched its offensive on the minicomputer market on 4 January, in Paris, when it announced the introduction of nine new models that will enable the national group to offer machines for specialized applications in many sectors. The line, ranging in price from 50,000 to 1.8 million francs per unit, reflects Bull's objective to achieve half of its 1986 sales on the office automation and the mini and microcomputer markets, a sector where worldwide sales are progressing more rapidly than those of medium-size and large systems. On this occasion, Bull announced the introduction of the SM90, a computer designed for scientific and telephonic uses, that was developed by the National Telecommunications Studies Center. This machine will cost about 200,000 francs, and 300-400 units could be sold this year. In addition, the group is also selling three bottom-of-the-line versions of the Mini 6 computers--Bull's battle horse in this sector--at prices ranging from 50,000 to 170,000 francs; these versions are essentially designed for the management of small or medium-size enterprises. Finally, the company announced the introduction of top and bottom-of-the-line models for the Mitra, designed specially for industrial management (from 0.5 to 1.1 million francs), and the expansion of the Solar line (from 90,000 to 1.8 million francs) designed for production process control. [Text] [Paris AFP SCIENCES in French 5 Jan 84 p 17] 9294

FRG SOFTWARE ASSOCIATION FORMED--At the beginning of this year, several software houses joined in the formation of the Association of German Software Producers (VDSH). At the "Systems '83" fair, they displayed their wares in a common booth for the first time. The members of the VDSH (Bochum) are spread all across Germany and to some extent into the international market through their foreign representatives. For the average consumer, an attempt will be made to remove the confusion from the wide array of offerings in the software market. Even the small shop master will be able to separate the wheat from the chaff when evaluating the products of the more than 3,000 offerors, Only software producers who have demonstrated their capability and reliability can become members of VDSH and advertise their programs with the membership in the association. The association obligates its members to subject their software products to certain test criteria; and the association reserves the right to make random inspections. Through this the association can guarantee that a VDSH program can still be maintained even when the original producer is no longer in existence. In this case the association can have a member firm provide the maintenance service. [Text] [Duesseldorf VDI NACHRICHTEN in German 4 Nov 83 p 24] 9160

FRENCH-INDIAN RESEARCH AGREEMENT--From New Delhi: A French-Indian agreement concerning research, development, and production of electronic equipment (computers, peripherals, disk-storage units) was signed on 15 Dec in New Delhi, following discussions within the French-Indian working-group, concerning cooperation in this area. This cooperation could find applications in the Airbus equipment of Indian Airlines, airlines reservation systems, and the equipment of telephone switching centers installed by CIT-Alcatel. [Text] [Paris AFP SCIENCES in French 15 Dec 83 p 33] 6445

NEC-BULL CONTRACT--Tokyo: Imminent agreement between NEC (Japanese Electronics Company) and Machines Bull for the sale in Europe of the Japanese super-computer. The Japanese company NEC, the main computer group in Japan, intends to cooperate with Machines Bull, the first French computer manufacturer, to market its most sophisticated computer model in Europe, as was learned on 6 Dec from the Japanese company. An agreement to sell NEC's super-computer, System ACOS 1000, using Bull's marketing network, and under the French company's brand name, is supposed to be signed in 1984, indicated an NEC representative. He added that this agreement is a complement to the agreement between NEC and the American company Honeywell, for the production of super-computers non-compatible with those marketed by the American giant IBM. [Text] [Paris AFP SCIENCES in French 8 Dec 83 p 44] 6445

CSO: 3698/222

REVIEW OF INDUSTRIAL ROBOTICS DEVELOPMENT ACTIVITIES

Paris ZERO UN INFORMATIQUE in French Jan 84 pp 33-34

[Unsigned article]

[Text] The robot war in industrial robotics is presently underway between Europe, the United States, and Japan.

It all began in Japan, when the Japanese Industrial Robots Association (JIRA) was created in 1972. At about the same time, Sweden also started along the same path. Since 1972, most of the large American automobile manufacturers acquired Unimate type robots; two years later, Regie Renault also became involved, launching the Spartacus project with the support of the Ministry of Industry.

Beginning in 1977, large national projects rapidly succeeded one another. In Japan, the Flexible Production Shop program used laser technology (1977-1984), and the RCW (Robot for Critical Work) project (1983-1990) is designed to study a robot that can work autonomously and which is endowed with manipulation capabilities, mobility, sensors, internal power source, autonomous information processing, and communications.

Japanese Against Americans

In the United States, the ICAM (Integrated Computer Aided Manufacturing) program supported by the Department of Defense, distributes technical progress reports to the participating companies, and France launches (1980-1984) the ARA (Advanced Automation and Robotics).

But in Japan and the United States, the number of private investments increased in addition to the public projects, and thanks to the joint action of JIRA and MITI, the importance of the Japanese began to be felt on the American and European markets thanks to agreements signed with national manufacturers.

It is at this point that the large American groups entered into the fray. In 1982, General Electric had acquired the strategic tool, CAD, by buying Calma six month earlier, and was thus in a position to project an image of "the plant of the future." Extensive technical and commercial cooperation agreements were concluded between the American company and Hitachi.

But the major event of 1983 was Westinghouse's purchase of Unimation. Following its technical cooperation agreements with Mitsubishi, Komiatsu, and Olivetti, this operation gave the American company a world class industrial position, which completed the previous transfers of technology.

As to IBM, its agreements stipulate the sale of Sankio-Seiki robots.

Stranded Europeans

Where do the Europeans stand faced with Japan's strength and America's opportunism, who together are little by little winning the robotics battle?

The European producers of industrial robots are headed by Sweden. Asea with the Electrolux branch (bought in 1981), has a production capability of nearly 900 units per year (15 percent of which from Electrolux), and exports nearly 90 percent of them.

The situation is not as bright in FRG: it has about 20 manufacturers, among which Volkswagen and Kuka, but nearly 45 percent of its machines are imported. Great Britain has opted to reach agreements with foreign manufacturers, and aware of the progressive technical dependence that the country is experiencing, the government has launched a national research program.

In Italy, the situation is much better. While it has only five producers, Norda, Basfer, Coman-Fiat, Olivetti, and Osai, they seem to satisfy the national demand quite well since the country imports only 16 percent of its needs.

In France, the report of the Economic and Social Council observed that in 1982, nearly 60 percent of the robots used in enterprises were imported. The computer-integrated manufacturing (CIM) project of the former minister of research and industry, Jean-Pierre Chevenement, drew the major outlines of an upcoming plan (in July 1982) which formed a veritable bridge between Pafe and the Machine-Tool Plan.

At the time, the financial three-year effort for a growth of 25 percent per year for our CIM industries was estimated at 2.4 billion francs; the plan also pointed out the role of regional centers to encourage national robotics. And although Laurent Fabius appears to be less eloquent than his predecessor, some decisions reached by the Council of Ministers of 28 July 1982 were implemented.

A new Mechanics-Robotics task force, under the responsibility of Jean-Francois Le Maitre, has been formed and we soon hope to learn its conclusions.

11,023
CSO: 3698/233

FACTORY AUTOMATION

FRENCH FIRM MARKETS NUMERICAL CONTROL SOFTWARE

Paris L'USINE NOUVELLE in French 5 Jan 84 p 40

[Article by Michel Defaux]

[Text] With the Goelan program, CN Industries offers an interactive graphic programming tool adapted to the needs of PMI (small and medium-sized industry).

By introducing its new program, the Goelan, at the beginning of this year, CN Industries intends to offer a modern programming tool for PMI, and thereby pursue its own expansion: from seven employees and a turnover of 2.15 million francs at its start in 1977, it now has 38 employees and a revenues that reach 13 million.

The secret of this small Lyons company? Carefully monitor the numerical control needs of PMI, and make best use of the latest computer developments so as to offer adapted and high performance products. Goelan for instance, perfected and presented on the American market one month ago by its Centech subsidiary in Chicago, uses a 512K memory, an interactive graphics board, and a plotter. It will allow PMI (the first two American customers employ 25-30 people) to gain some time in programming numerical controlled machine-tools, and to program with greater certainty by visualising the paths of parts and tools.

Clear Evolution Toward Graphic Systems

The operator is presented with a menu in French (selection of machining method, depth, and so on) and designs the part to be machined from his drawing. A new algorithm provides a selection of 30 possible geometrical shapes using only seven basic functions (positioning of a point, straight line, circle, intersection, connection, mirror image, and so on). With an electric pen, the operator marks characteristic points on the board and enters coordinates. "We wanted to eliminate as much of the keying and language as possible," explains Paul May, the company's president. "This is a product that denotes the evolution of our company toward graphic systems." During the definition of contours, the operator simply points the first and last element on the screen; Goelan then automatically determines the contour of interest and displays it on the screen.

A PMI's response time to an order, and consequent costs, can be greatly improved: "Machining which heretofore required eight hours of programming, now requires only two hours," states Dominique Laffret, director general. "With six hours of time gained on a machining center whose hourly rate is 500 francs, such a system can become profitable in one and one-half years." Built around a Hewlett-Packard 2000 desk computer, the equipment is sold for 150,000 francs in its basic version, and 220,000 francs for the color model.

Various modules are already available: point-to-point, milling/contouring (machining of pockets), turning, punching, wire spark erosion (visualization of the very complex displacement of the wire in the latest four-axis machines).

Lastly, CN Industries, confident of its knowledge of the American market and of the future evolution of computerized numerical control (CNC) systems, has thought about implementing the memorization of tool paths in an APT form instead of standard codes. Tomorrow's integrated-processor CNC systems will thus create no problems for Goelan users. "Our software was tested in France by customers, and two systems are already on order," concludes Paul May. "We expect to sell about 30 of them during 1984."

11,023
CSO: 3698/233

FRENCH GEAR UP TO CHALLENGE UNITED STATES IN CAD/CAM MARKET

Paris L'USINE NOUVELLE in French 5 Jan 84 p 41

[Article by Jacques Antoine]

[Text] An avalanche of new products and an ongoing large national project indicate that the Americans are losing their monopoly in computer aided design and manufacturing (CAD/CAM) equipment.

The latest line of graphic work stations from Secapa; the Radiance color terminal from Gixi, and the Strim 100 CAD/CAM software from the parent company, Cisi; the CAD software line Safirs with the Avisa work station from Assigraph; all of these are an unprecedented debut of new French CAD/CAM products.

The national suppliers are taking the offensive to break the American monopoly. Their stakes are "the computerization of production activities; the great adventure of the 80's and 90's; a market that has seen an annual growth of 35-40 percent" according to Patrick Nollet, chief executive of the Cisi group. Words to be compared to those of Vincent Piazzini, director general of Assigraph: "French CAD has represented about 20 percent of the French investments in the field for 1983."

Under these conditions we can understand the magnitude of the research and development carried out in France for some years past. According to Pizzani, the effort will even be increased: "It will represent 11 percent of our turnover, estimated at 50 million francs in 1984."

By becoming a subsidiary of the Serete group one year ago, Assigraph added a new and fruitful technologic know-how to its software writing abilities. "A first product was designed jointly in the form of a program for industrial project management." This example will spread to Serete's other subsidiaries in activities that are complementary to CAD, particularly to Simulog for scientific and technical calculations, and Enfi Design for analysis of product value and design.

At Cisi, the European leading company in computer service and consultation for technical applications, the figures speak for themselves: the 57 million francs derived from CAD/CAM last year represent barely 5 percent of its total revenues. "In five years, our development plan aims at 650 million francs for CAD/CAM alone; nearly one-half of our activitie. The personnel involved in this sector should grow from 70 people to 500 in 1988," states Patrick Nollet.

Without peer in France, Cisi chose to give priority to industrial CAD/CAM (associated with mechanical objectives), an option illustrated by the Strim 100 system, developed together with Snias, Neyrpic, Etca, and Inria. This very complete system, an extension of the Systrid and Condor software, is equally as good as its American counterparts in all respects. A more elaborate version, Strim 200, should be released in two or three years by the CAD/CAM development center opened by Cisi at Bouches-du-Rhone.

Assigraph and Cisi, among other French suppliers (Matra-Datavision, Secmai, and so on), display a well founded optimism, and that, because their ambitions enjoy the support of the government through the mobilizing program Mastery of the Development of the Electronics Industry, and its eight national research and development projects. Among the industrial enterprises associated with the ongoing CAD/CAM project (90 million francs are planned, half of it financed by the government), we find these two companies along with Bull, Simulog, and parapublic laboratories. The first phase in defining the specifications for this project should end in mid-1984, and the first industrial examples should come out by the end of 1986.

11,023
CSO: 3698/233

BRIEFS

BRITISH 'INTELLIGENT' WELDING ROBOT--A new company, Meta Machines, was just created in Great-Britain with the financial support of various companies and the Oxford University, to undertake the production of a new generation of "intelligent" robots. The first of these machines will be an arc-welding robot provided with an "eye" that will enable it to find the joint to be welded even when the position of the latter is not predetermined. This "eye" will be a sensor consisting of a laser and a miniature TV camera operating only a few centimeters away from a 2-kW arc. In particular, the machine will meet the needs of the automobile industry. Meta Machines will have a capital of close to one million pounds and its chief executive officer will be a research engineer from the Oxford University, Mr Peter Davey, who has been heading the British government's robot research program for the past four years. The welding robot is one of the results achieved by this program. Mr Davey will be assisted by Oxford university researchers. Financial support is provided in particular by a subsidiary of the Rothschild Bank in London, British Leyland (an automobile manufacturer) and General Electric Company (an electric and electronic engineering company). [Text] [Paris AFP AUTO in French No 3397 13 Jan 84 AFP 121809] 9294

CSO: 3698/246

FRENCH GALLIUM ARSENIDE IC SUBSTRATE DOES NOT DISLOCATE

Paris ELECTRONIQUE ACTUALITES in French 9 Dec 83 p 15

[Text] The Philips-related LEP (Electronics and Applied Physics Laboratories) have developed an experimental method for growing gallium arsenide monocrystals by the liquid-encapsulated Czochralsky pulling process. This method enabled them to produce 2-inch diameter GaAs ingots free of dislocations (or at least, with dislocations on the periphery only, and with a density smaller than 1,000/cm^2).

This method, based on gallium arsenide doping with isoelectronic impurity which do not modify the electronic properties of the material, results in n+ or p+ substrates for optoelectronics, as well as non-doped semi-insulating substrates for hyperfrequency components and integrated circuits.

Let us recall that in general, dislocations present in the substrate propagate into the devices and may have an influence on their life as well as their characteristics. The advantage of gallium arsenide ingots without dislocations, the first obtained by the Czochralsky method (another fabrication method called the Bridgman method also results in substrates with a low dislocation density (around 1,000/cm^2), but they are in general oval-shaped and with a smaller diameter, and it is impossible to obtain semi-insulating substrates) should be felt particularly in the fabrication of integrated circuits, although it is not known precisely today what could be the influence on substrates of the absence of dislocations. It should be remembered that many companies today are producing hyperfrequency components on GaAs substrates containing generally 10^4 to 10^5 dislocations per square centimeter, distributed in a totally inhomogeneous manner (with a higher density at the edge and the center of the wafers and at the tang end and the seed end of the ingot).

In the area of optoelectronics, it is the presence of dislocations which creates the greatest problem, but as we mentioned above, the Bridgman method is already available to resolve the problem on an industrial scale, which means that the work carried out at LEP should not have a large influence in this area.

No large impact can be foreseen in the area of FET's either (in this case, it is the inhomogeneous nature of the dislocations which presents the

greatest problem), except perhaps where the components' life or production yields are concerned. On the other hand, the impact should be much more important in the area of GaAs IC's in normally-off technology, because of the probable elimination of micro-inhomogeneity in the active areas. The LEP therefore intends now to concentrate on studying IC's produced on dislocation-free wafers. As far as the growing method itself is concerned, research is continuing in collaboration with several laboratories of the CNRS (National Center for Scientific Research), to try to understand the physical mechanisms involved in the growing of crystals with isoelectronic doping.

Zero dislocation at the center of the wafers

For the last two years now, LEP has been producing standard GaAs substrates (with 10^4 to 10^5 dislocations per square centimeter), using a fully-automated liquid encapsulated-Czochralsky pulling method (this results in particular in eliminating the need for an operator during the whole duration of the pulling process which lasts 6 to 7 hours), which makes possible the variation of the various parameters to obtain cylindrical ingots with a 55 mm diameter (2 inches after machining) and 1.2 kg weight. The apparatus is also used at RTC Limeil to fabricate GaAs ingots that the company sells on the open market.

When they tried fabricating dislocation-free GaAs ingots (these appearing to be related to the presence of thermal stresses inherent to the physicians of the growth process), the LEP researchers were faced with three choices:

- Increase the elastic limit of the GaAs in a "natural" manner by starting from a perfect crystal (necking technique used in growing silicon crystals and resulting in perfect monocrystals);

- lower the stresses by growing the crystal in the encapsulating liquid;

- artificially increase the elastic limit of the GaAs by doping;

The first two methods did not yield the expected results and the third method alone, using as dopant isoelectric elements from the third and fourth columns of Mendeleiev's table and with a high solubility limit, proved to be effective (trials using selenium gave good results as far as the dislocations are concerned, but introduced micro-precipitates which create as great a problem in the subsequent fabrication of the devices). The LEP finally settled on Indium as a dopant and, by introducing between 3 and 5×10^{19} atoms of In per square centimeter in the GaAs melt, succeeded in obtaining practically intrinsic 2-inch ingots of gallium arsenide with practically no dislocations (zero dislocations at the center of the wafers).

Other laboratories in the United States, in Japan, and in the FRG are also conducting research in the same area, but LEP seems to be ahead by a full length (let us point out, however, that Sumitomo, the first world producer of GaAs produced by the Bridgman method, has just installed Czochralsky pulling machines on a large scale).

6445
CSO: 3698/221

FRG FUNDS MICROELECTRONICS RESEARCH AT GMD, UNIVERSITIES

Munich COMPUTERWOCHE in German 30 Sep 83 p 84

[Article: "BMFT Supports Micro Research"]

> [Text] St Augustin--The objective of the program "Development of Integrated Circuits" (EIS), which was authorized and is supported by the Federal Minister for Research and Technology (BMFT), is expansion of university research and training capacities in the field of microelectronic circuit design. Involved so far are 11 universities with about 25 teaching chairs and the Society for Mathematics and Data Processing (GMD), St. Augustin.

In the joint project, compatible design aids will be brought together, interfaced and further developed. In all probability, the system will be made freely available to the universities in a form which makes later expansions possible. In order to guarantee the close tie with industrial practice, it is planned from the beginning to allow circuits to be manufactured on a professional basis. The large number of designs will make it possible to solve scientific, organizational and financial problems associated with chip manufacturing for research purposes.

During the life of the project, GMD will assume the function of a coordination center. Jointly with representatives of the project participants, they will develop process specifications and operate an appropriate reference facility. Further, they will see to it that the program packets of the individual participants are received and distributed, that the chips are manufactured under contract and finally that the administrative side of the program functions smoothly. In turn, project management will assure that the design program corresponds to a professional level and that the results can be used in practice. According to their own statements, the project participants and GMS will cooperate closely with the German semiconductor industry in order to be able to manufacture the chips as well. The institute for Solid State Technology of the Fraunhofer-Society will provide support in coordinating required tests.

In view of the demand for research activities, the Minister for Research and Technology assumes the burden of financing the necessary investments and the additional scientific personnel required for the three-year program. For their part, the states will provide additional investments, the teaching activities and operation of the facilities. GMD's contribution includes investments for the reference facilities and the required personnel expenses.

9160
CSO: 3698/223

BRIEFS

FRG MAKES FASTEST SWITCHING CIRCUIT--A microelectronic circuit which handles up to two billion characters per second was recently developed by researchers at the Ruhr University, Bochum. Thus, the chip is four to five times as fast as similar circuits available on the market to day, according to staff members of the Semi-conductor Component Group (Prof Dr Engineer Hans-Martin Rein) and of the Chair for Electronic Components (Prof Dr Engineer Berthold Bosch and Prof Dr Engineer Uhlrich Langmann). The new chip will be used first at the Heinrich Hertz Institute in Berlin in an experimental cable for future broadband communication technology which uses glass fibers as a transmission medium. Initially, 1.12 billion characters per second are to be sent over the glass fibers. For this field of application, the Bochum team is developing other circuits with similarly high working speeds. The work is primarily financed by the BMFT. [Text] [Duesseldorf VDI NACHRICHTEN in German 23 Dec 83 p 1] 9160

THOMSON SEMICONDUCTORS IN AIX-LES-BAINS--As a result of the takeover of Alcatel Semiconductors by Thomson-CSF (see ELECTRONIQUE ACTUALITIES of 23 Sep), the Aix-les-Bains plant of the old CIT-Alcatel affiliate should be dedicated to the production of the prediffused CMOS circuits including up to 1,000 gates currently produced by EFCIS (French Company for the Design and Production of Special Integrated Circuits) in Grenoble. Initially, Alcatel Semiconductors was supposed to produce prediffused circuits in this facility, using the Semi-Processes Inc method, but it may be remembered that Alcatel withdrew from this agreement with SPI several months ago. [Text] [Paris ELECTRONIQUE ACTUALITIES in French 16 Dec 83 p 11] 6445

CSO: 3698/222

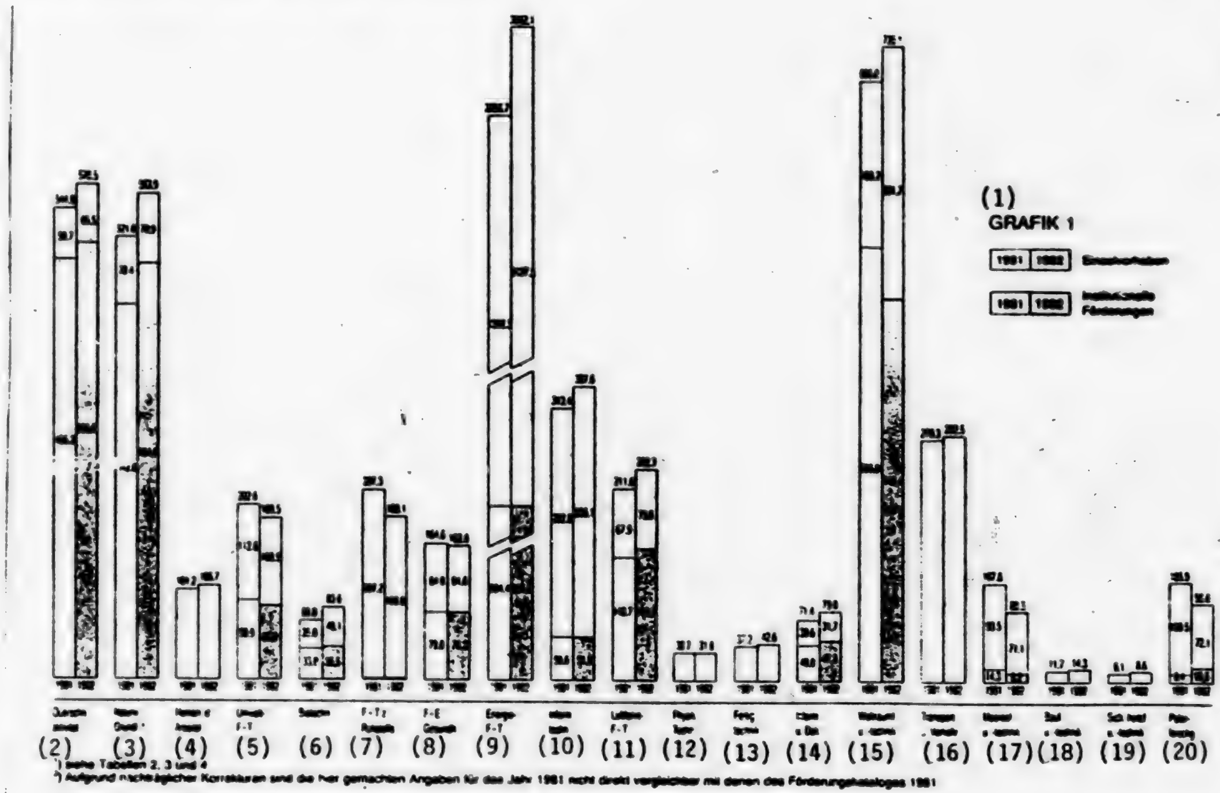
FRG HIGH TECH R&D GRANTS FOR 1982 FROM BMFT

Total Grants to Institutions, Projects (1981-82)

Bonn BMFT FOERDERUNGSKATALOG 1982 in German July 1983 pp 2-6

/Text/ Overview[1)] According to Funded Areas and Funding Amounts 1981 and 1982 in Millions DM[2)]

Key:
1. Chart 1
   1981 1982 Individual Projects
   1981 1982 Institutional Funding
2. Cross-section activity
3. Science, basic research
4. Humanization of the work place
5. Environmental research and technology
6. Biotechnology
7. Research and Tz (technology) Raw materials
8. Research and development, health
9. Research and technology, energy
10. Information technology
11. Aircraft research and technology
12. Physics technology
13. Production engineering
14. Information and documentation
15. Space travel and technology
16. Transportation and traffic
17. Oceanography and maritime engineering
18. Construction engineering
19. Safety engineering
20. Polar research



1) See Tables 2, 3, and 4
2) Because of subsequent corrections, the present data for 1981 are not directly comparable with those of the 1981 funding catalog

Table 1: Survey
Institutional Funding[1)], Project Funding[2)], and Other Individual Projects[3)]
According to Funding Areas and Funding Amounts 1981 and 1982 in DM[4)]

Funding Area	Number of Projects 1981	Funding Amount 1981	Number of Projects 1982	Funding Amount 1982	Rate of Increase in Percent
00 Cross-section activity	104	544,902,914	100	570,522,033	4.70
01 Science, basic research	528	521,041,909	645	563,938,207	8.23
02 Humanization of the work place	349	101,156,079	356	106,686,567	5.47
03 Environmental research and technology	377	202,638,466	398	188,506,990	-6.97
04 Biotechnology	113	68,024,978	126	83,597,306	22.89
05 Research and technology, raw materials	802	207,330,584	888	188,074,507	-9.29
06 Research and development, health	433	164,629,154	421	162,792,757	-1.12
07 Research and technology, energy	1,095	2,296,713,913	1,053	3,062,127,402	33.33
08 Information technology	592	313,365,746	525	337,625,648	7.74
09 Aircraft research and technology	88	211,595,361	77	222,357,508	5.09
10 Physics technology	133	30,718,782	134	31,789,441	3.49
11 Production engineering	209	37,163,230	225	42,627,852	14.70
12 Information and documentation	117	71,455,532	96	78,979,028	10.53
13 Space travel and technology	436	696,054,389	419	735,116,896	5.61
14 Transportation and traffic	263	278,338,984	225	282,474,379	1.49
15 Oceanography and maritime engineering	245	107,776,507	233	80,345,485	-25.45
16 Construction engineering	62	11,738,388	49	14,307,264	21.88
17 Safety engineering	29	6,132,848	37	8,644,312	40.95
18 Polar research	15	106,915,253	10	90,564,031	-15.29
Total Direct Funding	5,990	5,977,693,018	6,017	6,851,077,612	14.61
Indirect-Specific Funding				87,390,705	

1) See Table 2
2) See Table 3
3) See Table 4
4) Because of subsequent corrections, the present data for 1981 are not directly comparable with those of the 1981 funding catalog

Table 2: Institutional Funding and Services to Foreign and International Institutions According to Funding Areas and Funding Amounts 1981 and 1982 in DM

Funding Area	Institutional Funding 1981 No.	Institutional Funding 1981 Amount	Institutional Funding 1982 No.	Institutional Funding 1982 Amount	Services to Foreign and International Institutions: Member Contributions 1981 No.	Member Contributions 1981 Amount	Member Contributions 1982 No.	Member Contributions 1982 Amount	Other Services 1981 No.	Other Services 1981 Amount	Other Services 1982 No.	Other Services 1982 Amount
00 Cross-section activity	18	468,907,659	18	490,057,020	2	13,717,202	2	12,271,228	4	2,564,000	4	2,727,526
01 Science, basic research	8	273,016,568	8	290,786,806	1	169,592,600	1	193,176,961				
03 Environmental research and technology	4	89,811,409	4	84,729,656					1	208,000	1	230,000
04 Biotechnology	3	22,917,011	3	24,340,288	2	10,094,984	2	11,141,559				
05 Research and technology, raw materials									1	92,370	2	51,000
06 Research and development, health	4	79,859,624	4	78,152,358								
07 Research and technology, energy	9	869,785,600	8	887,868,445	2	29,441,773	2	30,710,909	4	5,193,909	4	5,989,683
08 Information technology	5	50,552,329	5	51,548,774								
09 Aircraft research and technology	2	143,658,162 1)	2	148,757,508 1)								
12 Information and documentation	12	40,834,868	13	47,285,436								
13 Space travel and technology	3	118,479,750	3	107,427,251	1	388,319,442	1	335,972,823				
15 Oceanography and maritime engineering	4	14,140,650	4	9,135,581	1	13,017	1	11,685	2	130,000	1	77,988
18 Polar research	2	6,373,120	2	18,454,495								
Total	74 2)	2,178,336,750	74 3)	2,238,543,617	9	611,179,019	9	583,285,166	12	8,188,279	12	9,076,197

1) This item contains resources from the BMVG (Defense Department) budget.

2) Number of 1981 approvals for 38 funded institutions

3) Number of 1982 approvals for 39 funded institutions

Table 3: R&D Projects, R&D-Relevant Investments, Studies, Expert Opinions, Auxiliary Projects and Project Services[1)] According to Funding Areas and Funding Amounts 1981 and 1982 in DM[2)]

Funding Area	Number of Projects 1981	Funding Amount 1981	Number of Projects 1982	Funding Amount 1982	Rate of Increase in Percent
00 Cross-section activity	53	40,503,648	50	44,796,929	10.60
01 Science, basic research	501	78,313,150	619	79,867,133	1.98
02 Humanization of the work place	337	100,753,396	345	106,271,254	5.48
03 Environmental research and technology	369	112,188,336	391	103,440,390	-7.80
04 Biotechnology	106	35,011,007	118	47,939,338	36.93
05 Research and technology, raw materials	797	206,723,840	881	186,582,429	-9.74
06 Research and development, health	427	84,706,151	415	84,502,591	-0.24
07 Research and technology, energy	1,040	1,321,739,192	999	2,077,635,281	57.19
08 Information technology	579	262,247,194	513	285,601,309	8.91
09 Aircraft research and technology	83	67,843,580	72	73,486,030	8.32
10 Physics technology	133	30,718,782	134	31,789,441	3.49
11 Production engineering	208	36,283,230	220	41,948,695	15.61
12 Information and documentation	103	30,560,565	82	31,683,622	3.67
13 Space travel and technology	420	189,002,106	403	291,012,689	53.97
14 Transportation and traffic	260	277,419,984	223	281,898,694	1.61
15 Oceanography and maritime engineering	235	93,357,557	225	71,026,856	-23.92
16 Construction engineering	61	11,668,149	47	14,207,366	21.76
17 Safety engineering	25	5,850,627	33	8,282,744	41.57
18 Polar research	13	100,542,133	8	72,109,536	-28.28
Total Direct Funding	5,750	3,085,432,626	5,778	3,934,082,328	27.51
Indirect-Specific Funding				87,390,705	

1) Not included herein are institutional fundings, services to foreign and international institutions (Table 2) as well as other individual projects (Table 4)

2) Because of subsequent corrections, the present data for 1981 are not directly comparable with those of the 1981 funding catalog

Table 4: Funding for Scientific Growth (Foreign Stipends) of International Exchange of Information[1] and Other Items, According to Funding Areas and Funding Amounts 1982 in DM

Funding Area	Funding of Scientific Growth No.	Funding of Scientific Growth 1982 Funding Amount	Funding of International Exchange of Information No.	Funding of International Exchange of Information 1982 Funding Amount	Other No.	Other 1982 Funding Amount
00 Cross-section activity			16	18,781,468	10	1,887,863
01 Science, basic research			17	107,307		
02 Humanization of the work place			1	26,200	10	389,113
03 Environmental research and technology			1	105,400	1	1,544
04 Biotechnology			3	176,121		
05 Research and technology, raw materials			4	1,431,533	1	9,545
06 Research and development, health				15,725	2	122,084
07 Research and technology, energy			10	2,666,790	30	57,256,294
08 Information technology			6	397,565	1	78,000
09 Aircraft research and technology			3	113,970		
11 Production engineering			2	600,000	3	79,157
12 Information and documentation			1	9,970		
13 Space travel and technology	1	369,840	7	147,532	4	186,761
14 Transportation and traffic			1	366,491	1	209,193
15 Oceanography and maritime engineering			2	93,374		
16 Construction engineering			1	75,898	1	24,000
17 Safety engineering			4	361,567		
Total	1	369,840	79	25,476,911	64	60,243,553

Detail of Grants Over DM 5 Million

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Allocation Receiver, Performing Agency	Topic, Task Definition	Running Time Beginning End	Funding Amount 1982 in DM
Fast Breeder Nuclear Power Plant Association MBH 4300 Essen 1	Erection of the 280 MW SNR Prototype Nuclear Power Plant (SNR-300)	1970 - 86	563,615,749
International Sodium Breeder Reactor Construction Company MBH (IMB) 5060 Bergisch Gladbach 1			
High-Temperature Nuclear Power Plant GmbH (HKG) 4700 Hamm 1	Erection of the 300 MWE THTR Prototype Nuclear Power Plant (THTR 300)	1970 - 84	360,174,162
Consortium THTR C/O Brown, Boveri * CIE AG (BBC) 6800 Mannheim 31			
Messerschmitt-Boelkow-Blohm GmbH (MBB) 8012 Ottobrunn	Experimental installation of their magnetic track in Emsland	1978 - 85	82,600,000
Business Area for new Traffic Systems of the MBB 8000 Munich 22			
Eurosatellite GmbH 8000 Munich 22	Development and production of the German and French radio satellite TV-SAT and TDF-1, preliminary contract	1981 - 85	72,321,980
Consortium for the Polar Research Ship C/O Howaldts Works - German Shipyard AG Hamburg and Kiel/Nobiskrug Shipyard GmbH 2370 Rendsburg	Construction of the German research and supply ship	1980 - 82	60,642,000
Model Power Plant Voelklingen GmbH 6600 Saarbruecken	Development, erection, and tryout of an environmentally compatible anthracite power plant	1982 - 83	47,793,244
Product Area of the Power Plants of the Saar Mines AG 6600 Saarbruecken			

Allocation Receiver, Performing Agency	Topic, Task Definition	Running Time Beginning End	Funding Amount 1982 in DM
Messerschmitt-Boelkow-Blohm GmbH (MBB) 8000 Munich 80 Business Area on New Traffic Systems of the MBB 8000 Munich 22	Erection of the steel way with longitudinal stator components, switch 2 as well as guide rails, stator bolts and bending supports for switch 1 (Transrapid Experimental Installation - Emsland)	1982 - 83	44,488,546
Ruhrkohle AG 4300 Essen 1 Coal-Oil Pilot Plant at Bottrop of Ruhr Coal Oil and Gas GmbH 4250 Bottrop 1	Construction operation of a coal-oil pilot plant	1982	40,000,000
Power Plant Union AG (KWU) 8520 Erlangen 2 Department VE3/RE3 of the KWU 8520 Erlangen 2	American-German-Japanese Research Project to Analyze the Refill and Flooding Phase in the Emergency Cooling of 2 WR's (20/30)	1981 - 85	36,010,398
Rhennish Brown Coal Works AG 5000 Cologne 41	Construction of the Pilot Plant for Coal Gasification by Hydrogenation	1979 - 82	32,763,416
German Society for the Reprocessing of Nuclear Fuels MBH (DWK)	Planning, erection, and operation of the Pamela Demonstration Installation in Mol for the vitrification of highly radioactive wastes	1979 - 85	31,519,245
Societe Arianespace f- Evry/France	Ordering an Ariane Launch for TV-SAT	1981 - 85	29,816,884
Model Power Plant in Voelklingen GmbH 6600 Saarbruecken Product Area of the Power Plants of the Saar Mines AG 6600 Saarbruecken	Development, erection, and tryout of an environmentally compatible anthracite power plant	1977 - 82	29,469,348
Uranit Uranium Isotope Separation Company MBH 5170 Juelich 1	Development program for the project of uranium enrichment with gas centrifuges - gas ultracentrifuge	1980 - 85	29,295,533

Allocation Receiver, Performing Agency	Topic, Task Definition	Running Time Beginning End	Funding Amount 1982 in DM
Physical-Technical Federal Institute 3300 Braunschweig	Site Exploration Program at Gorleben	1982 - 83	27,500,000
AEG Telefunken System Engineering AG 2000 Wedel Technical Area for New Technologies, Space Travel of the AEG Telefunken Systems Engineering AG 2000 Wedel	Development and prototype construction of photovoltaic energy supply systems	1981 - 86	24,338,629
Salzgitter AG 3320 Salzgitter 41 Salzgitter Industrial Construction GmbH 3320 Salzgitter 41	Development of a tube reactor method for the catalytic very high pressure hydration of brown and anthracite coals	1982 - 84	20,960,634
Veba Oil AG 4650 Gelsenkirchen Veba Oil Development Company MBH 4650 Gelsenkirchen	Primary treatment of heavy oils and bitumen to generate synthetic raw oils capable of storage and transport	1981 - 82	20,578,800
Thyssen AG 4100 Duisburg 11	Efficient energy utilization in an integrated metallurgical plant by CO gas recovery and utilization	1979 - 85	18,721,600
Construction and Operating Company for Large Wind-Energy Systems MBH	Construction of the large wind-energy system Growian I with an electronic output of 3 MW (erection phase)	1979 - 83	18,081,800
Society for the Gasification of Anthracite MBH 4600 Dortmund I	Construction operation of a 10 T/H prototype system for the VEW coal conversion process (pressurized operation)	1982 - 85	17,700,000
National Aeronautics and Space Administration (NASA) USA - Washington	Implementation of the first German space lab mission D 1 (technology laboratory), here: furnishing the required starting services of the NASA Space Transportation System by NASA	1982 - 85	16,202,633
Interatom International Atomic Reactor Construction GmbH 5060 Bergisch Gladbach 1	Technology Program GAST	1981 - 86	16,070,000
Interatom International Atomic Reactor Construction GmbH 5060 Bergisch Gladbach 1	PNP development work on the nuclear heat generation system (PNP-NWS)	1982	15,000,000

Allocation Receiver, Performing Agency	Topic, Task Definition	Running Time Beginning End	Funding Amount 1982 in DM
Interatom International Atomic Reactor Construction GmbH 5060 Bergisch Gladbach 1	Construction-related research and development program SNR 300	1982	14,202,019
National Coal Board Ltd. International Energy Agency Services GB- London/Great Britain	Construction and operation of an experimental system for basic technological investigations on fluidized bed combustion under pressure. The results to be worked out will form the basis for designing commercial systems of this design	1979 - 84	13,901,000
Dornier GmbH 7990 Friedrichshafen	Technology carrier for investigating new possibilities of amphibian aircraft - phase II	1980 - 84	13,600,000
Interatom International Atomic Reactor Construction GmbH 5060 Bergisch Gladbach 1	Plan-associated R&D program SNR - further development	1982	12,070,782
AEG Telefunken Systems Engineering AG 2000 Wedel	Development and prototype construction of photovoltaic energy supply systems	1977 - 82	11,928,457
Business Area of Industrial Installations, Shipbuilding, and Special Engineering of AEG Telefunken, Systems Engineering AG 2000 Wedel			
Thyssen Gas GmbH 4100 Duisburg 11	Methanization of coal gasification gases in a fluidized bed; pilot-development stage	1980 - 84	11,746,440
Steel Works Peine-Salzgitter AG 3150 Peine	Keeping open the shaft system and preserving the existing mining equipment, machinery, machine systems, and buildings to perform suitability studies for the storage of radioactive wastes	1976 - 82	11,498,000
High Temperature Reactor Construction GmbH 6800 Mannheim	PNP development work on the nuclear heat generation system (PNP-NWS)	1982	10,000,000
High Temperature Nuclear Power Plant GmbH (HKG) 4700 Hamm 1	Development of a 300 MWE thorium high temperature prototype nuclear power plant	1982	10,000,000
Consortium Thtr C/O Brown, Boveri & CIE AG (BBC) 6800 Mannheim 31			

Allocation Receiver, Performing Agency	Topic, Task Definition	Running Time Beginning End	Funding Amount 1982 in DM
Siemens AG 8000 Munich 80	New architectural characteristics and basic components for VLSI processors	1981 - 84	9,983,857
Interatom International Atomic Reactor Construction GmbH 5060 Bergisch Gladbach 1	Engineering work on the multipurpose research reactor MPR 30 for the Indonesian Research Center in Puspiptek	1981 - 86	9,934,684
Agency for Science and Research of the Free and Hansiatic City of Hamburg 2000 Hamburg 76 Computer Center of the Uni Hamburg 2000 Hamburg 13	New equipment for the computer center of the Uni Hamburg (Regional Computer Center) with a Siemens 7.882 system and a Siemens 6.640/6.610 terminal network	1981 - 82	9,803,457
Messerschmitt-Boelkow-Blohm GmbH (MBB) 8000 Munich 80 Business Area of Space Travel of the MBB 8000 Munich 80	First implementation and modification, production, and acceptance tests of 400 N and 10 N propulsion systems for project JOP-RPM 2. Procurement, preparation, and readiness of fuels for project JOP-RPM	1977 - 83	9,461,000
Siemens AG 8520 Erlangen 2 Duewag AG 4150 Krefeld 11	H-train erection of an operational demonstration system	1978 - 83	9,446,250
Erno Space Travel Engineering GmbH 2800 Bremen	Project Spacelab Mission D 1, payload integration - Phase C/D	1982 - 85	9,382,688
Kloeckner Coal Gas GmbH 2800 Bremen	Coal gasification in the Eisenbad reactor - non-investment part, process-related: Phases 1 and 2, Section I, Extended Research and Optimization Program	1981 - 83	9,315,737
Siemens AG 8000 Munich 80	Preliminary work on the development of VLSI processors with 1 M YM structures	1981 - 84	9,223,631
Siemens AG 8000 Munich 80 Business Area on Construction Elements of Siemens AG 8000 Munich 80	Basic materials for solar silicon	1980 - 83	9,052,756

Allocation Receiver, Performing Agency	Topic, Task Definition	Running Time Beginning End	Funding Amount 1982 in DM
Nuclear Research Center at Karlsruhe GmbH (KFK) 7500 Karlsruhe 1	Safety-engineering studies on the HDR system for deepening the knowledge concerning the properties and structural behavior of systems and components of a light water reactor	1976 - 84	9,000,000
Alkem GmbH 6450 Hanau 11	Recycling of plutonium 1982	1982	8,999,973
Kloeckner Works AG 4100 Duisburg Georgsmarien Works of the Kloeckner Works AG 4500 Osnabrueck	Development of the Kloeckner steel production method, construction and testing of the KS prototype equipment	1979 - 83	8,921,320
Rhenish Brown Coal AG 5000 Cologne 41	Coal gasification in the high temperature Winkler gasifier	1981 - 83	8,754,325
Brown, Boveri & CIE AG (BBC) 6800 Mannheim 31 Central Research Laboratory of the BBC 6900 Heidelberg 1	Development of sodium/sulfur storage batteries	1981 - 85	8,615,543
Potassium ahd Salt AG 3500 Kassel Potassium and Salt AG 6433 Philippsthal	Further development and demonstration of the utilization of the electrostatic preparation involving potassium sulfate production from carnallitic raw salt with the objective of reducing waste water, saving energy, and improving yields, in the Hattorf Plant	1979 - 83	8,523,008
Daimler-Benz AG 7000 Stuttgart 60	Alternative energies for road traffic. Project area on hydrogen technology and electrotraction	1981 - 84	8,490,575
Messerschmitt-Boelkow-Blohm GmbH (MBB) 2103 Hamburg 95 Business Area of Transport and Traffic Aircraft (UT) of the MBB 2103 Hamburg 95	Development and testing of a lateral tail surface box for the Airbus in a composite fiber construction mode - Phase III	1982 - 84	8,330,272
Siemens AG 8000 Munich 80	Development of VLSI memory components	1980 - 85	8,235,272

Allocation Receiver, Performing Agency	Topic, Task Definition	Running Time Beginning End	Funding Amount 1982 in DM
Organization for Economic Collaboration and Development (OECD) - International Energy Agency (IEA) Paris/France	The Fenton Hill Hot Dry Rock Geothermal Project	1979 - 85	8,086,645
United States Department of Energy U.A. USA- Washington/USA			
Magnetic Train GmbH 8130 Starnberg	Further development and testing of a new technology for local traffic means with the identifying characteristic: roadway migrating field drive (H-train system)	1979 - 84	8,048,764
Heliotronic Research and Development Company for Solar Cell Materials MBH 8263 Burchausen	Silicon - material development of terrestrial solar cells	1982 - 86	8,000,000
Electrical Works Wesertal GmbH 3250 Hameln 1	Erecting and testing an environmentally compatible anthracite coal power plant with an atmospheric fluidized bed combustion	1979 - 84	7,683,554
Dornier System GmbH 7990 Friedrichshafen	Sonntlan Phases (and II, cooperation with Mexico in the area of solar energy	1978 - 83	7,620,608
Provincial Agency of the Bodensee Area 7090 Friedrichshafen	Call bus experimental system, large trial operation	1978 - 83	7,609,497
State Material Testing Institute, Uni Stuttgart 7000 Stuttgart 80	Determination of the strength and deformation behavior of unwelded and welded large tensile test specimens of ferritic and austenitic steels with high stress and deformation speed - Stage II	1979 - 84	7,100,000
Ministry for Provincial and City Development of the Province of North Rhine Westphalia 4000 Duesseldorf 1	Setting up a pressure-operated fluidized-bed steam-generation system with a maximum steam power of 50 T/H for the heat power plant of the TH Aachen	1981 - 85	7,050,000
State Construction Office for the TH Aachen 5100 Aachen			
Working Community on Pressurized gasification, Ruhr gas AG/Ruhrkohle AG/Steag AG 4300 Essen 1	Production of synthetic gas, city gas, and natural exchange gas by pressurized gasification of pieces of anthracite with oxygen - Lurgi-pressurized gasification	1982 - 83	6,796,602

Allocation Receiver, Performing Agency	Topic, Task Definition	Running Time Beginning End	Funding Amount 1982 in DM
Saarberg and Dr. C. Otto Company for Pressurized Coal Gasification MBH 6600 Saarbruecken 1	Development and testing of a process for the gasification of coal under pressure in a dust flow with the Saarberg/Otto gasifier	1981 - 82	6,690,225
Technical Monitoring Association Rhineland E.V. (a registered association) 5000 Cologne 91	Solar Village, Indonesia, Phase II	1980 - 84	6,615,893
Dornier System AG 7990 Friedrichshafen	X-ray satellite, system definition - Phase B2	1982 - 83	6,500,000
Salzgitter AG 3320 Salzgitter 41 Peine-Salzgitter Steel Works AG 3320 Salzgitter 41	Construction and operation of a pilot plant for the heat association of dry coke cooling and the preheating of coking coal	1979 - 83	6,456,150
Industrial Systems Operating Company MBH (IAB) 8012 Ottobrunn	Operating contract 1982 including adaptation measures to the state of the art (Title 104 and 103 B)	1982	6,400,800
German Company for the Reprocessing of Nuclear Fuels MBH (DWK)	Solidification of highly radioactive waste solutions in borosilicate glass for safe final storage of the fission products	1982 - 83	6,275,222
Alkem GmbH 6450 Hanau 11	Development of new production methods for SBR mixed oxide fuels and fuel elements	1980 - 82	6,257,380
Hobeg High Temperature Reactor - Fuel Elements GmbH 6450 Hanau 11	Development program for fuel elements with low-enriched uranium for high-temperature reactors	1982 - 85	6,251,711
Fraunhofer Society for the Promotion of Applied Research E.V. (FHG) 8000 Munich 19 Fraunhofer Inst. for Solid State Technology (IFT) 8000 Munich 60	Construction and preparation of the working foundations for a laboratory for sub-micron technology at the Berlin Electron Storage Ring	1982 - 85	6,242,392
Salzgitter AG 3320 Salzgitter 41 Otto & Comp. GmbH, C., DR. 4630 Bochum 1	Construction and testing of a large-scale low-temperature pyrolytic system to remove special wastes with raw material and energy recovery	1982 - 84	6,200,000

Allocation Receiver, Performing Agency	Topic, Task Definition	Running Time Beginning End	Funding Amount 1982 in DM
Union Rhenish Brown Coal Fuels AG 5047 Wesseling	Planning, erection, and operation of a demonstration plant (conversion of methanol to gasoline according to the Mobil process)	1979 - 84	6,139,281
Nuclear Research Center at Karlsruhe GmbH (KFK) 7500 Karlsruhe 1	Proportionate operating costs of the SIN for experiments of German groups	1982	5,977,097
D.R.P. German Tire and Plastic Pyrolysis GmbH 2102 Hamburg 93	Development, construction, and operation of a demonstration plant for the recycling of materials through the pyrolysis of old tires, plastic, and other hydrocarbons	1980 - 83	5,900,924
Uranit Uranium Isotope Separation Company MBH 5170 Juelich	Operation of the Uranit in Juelich and development programs in the area of uranium enrichment	1979 - 83	5,874,513
Thyssen AG 4000 Duesseldorf 1 Department on Product and System Development of Thyssen AG 4000 Duesseldorf 1	Development and construction of a plant for the form welding of container charges, production of a charge which cannot be fabricated conventionally	1979 - 83	5,637,500
Senator for Science and Art of the Free Hanseatic City of Bremen 2800 Bremen 1	Supplementation of technical-scientific basic equipment of the German Antarctic Research Station Georg-Von-Neumayer	1981 - 84	5,613,600
Interatom International Atomic Reactor Construction GmbH 5060 Bergisch Gladbach 1	Project-related work on the development and securing of the overall safety-engineering concept of sodium-cooled fast breeder reactors with large power	1979 - 82	5,608,291
GFK Society for Coal Liquifaction MBH 6600 Saarbruecken Project Group, Pilot Plant on the Coal Hydration of the Saar Mines AG 6620 Voelklingen-Fuerstenhausen	Expansion of the raw materials basis of refineries by the inclusion of anthracite; 6 TATO pilot plant for coal hydrogenation	1981 - 83	5,529,544
Research Institute for Motor Vehicles and Motor Vehicle Engines (FKFS) 7000 Stuttgart 80	Construction and testing of experimental models of a combination vehicle of the medium class with special consideration of aspects concerning energy, environment, and safety, in particular the component tasks: engine, aerodynamics, brakes	1979 - 82	5,456,490

Allocation Receiver, Performing Agency	Topic, Task Definition	Running Time Beginning End	Funding Amount 1982 in DM
Bioferon Biochemical Substances GmbH 7958 Laupheim 1	Continuation of production and testing of interferon	1981 - 83	5,306,759
Siemens AG 8000 Munich 80 Business Area of Components, of Siemens AG 8000 Munich	Very highly integrated circuits for communications technology	1979 - 83	5,199,625
Mining Research GmbH 4300 Essen 13	Prototype installation, nuclear process heat (PNP) R&D work on steam gasification of coal	1982 - 83	5,192,021
Berzelius Metallurgical Plant Society MBH 4100 Duisburg 28	Erection and experimental operation of a continuous 30,000 tons-per-year demonstration installation for the environmentally compatible and energy saving lead purification / QSL method	1980 - 83	5,136,007
Joint Research Agency ISPRA of Euratom Brussels/Belgium Joint Research Agency ISPRA of Euratom Ispra-Varese/Italy	LOBI-Mod2-Project: Influence of the pressurized water reactor recirculation loops on the loss of coolant accident (blowdown) in the case of small and medium ruptures	1982 - 84	5,128,627
VAW United Aluminum Works AG 5300 Bonn 1 VAW Lippen Works 4670 Luenen	Construction and operation of a demonstration system for the energy supply of an aluminum oxide factory with the combustion of low-grade coal in the circulating fluidized bed with a heat power of 67 CCAL/STD	1980 - 83	5,096,700
Nukem GmbH 6450 Hanau 11	Other waste removal techniques for burned-out nuclear fuel	1981 - 84	5,076,751
Messerschmitt-Boelkow-Blohm GmbH (MBB) 8012 Ottobrunn	Technology of novel dynamical systems for helicopters	1981 - 84	5,055,424

Grants in Biotechnology

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/Excerpts/

Allocation Receiver, Performing Agency	Topic, Task Definition	Running Time Beginning End	Total Funding in DM
European Laboratory for Molecular Biology (EMBL) 6900 Heidelberg 1	Basic research in molecular biology	1982	8,969,098
Society for Biotechnological Research MBH (GBF) 3300 Braunschweig	Operation (for task definition and annual working program 1982 see Appendix)	1982	18,710,000
Society for Biotechnological Research MBH (GBF) 3300 Braunschweig	Investment (for task definition and annual working program 1982 see Appendix)	1982	5,630,000
Bayer AG 5090 Leverkusen Department on Plant Protection of the Bayer AG 5090 Leverkusen	New plant protection materials from microorganisms	1980 - 83	12,900,000
Nattermann & CIE GmbH, A. 5000 Cologne 30	Isolation of fractions and substances by means of PZK (expansion unknown), for a pharmacological-biochemical screening to find therapeutically relevant action principles, and to obtain raw materials that are scarce and hard to synthesize	1979 - 83	5,084,050
Schering AG 1000 Berlin 65	Cultivation and breeding of solanum marginatum and isolation of the steroid element solasodin contained in fruits, in developing countries/Ecuador	1980 - 84	7,089,170
Bioferon Biochemical Substances GmbH 7958 Laupheim 1	Continuation of the production and testing of interferon	1981 - 83	9,942,300
Bioferon Biochemical Substances GmbH 7958 Laupheim 1	Production and testing of human gamma interferon	1982 - 86	9,066,486
Degussa AG 6000 Frankfurt 1 Technical Area on Chemical Research of Degussa AG 6450 Hanau 1	Development of enzymatic and microbial methods for amino acid synthesis	1982 - 86	6,100,150

Grants in Computers, Microelectronics

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[Excerpts]

Allocation Receiver, Performing Agency	Topic, Task Definition	Running Time Beginning End	Total Funding in DM
Society for Mathematics and Data Processing MBH (GMD) 5205 SANKT AUGUSTIN 1	Operation (for task definition and annual working program 1982 see Appendix)	1982	41,500,885
Nixdorf Computer AG 4790 Paderborn Development Area of Nixdorf Computer AG 4790 Paderborn	Fail-safe data manager for distributed office systems	1982 - 84	5,383,517
Siemens AG 8000 Munich 83 Business Area on Data and Information Systems of Siemens AG 8000 Munich 83	Data protection techniques for medium to large data processing systems	1981 - 83	8,535,000
Bavarian State Office 8000 Munich	Automation of the land register taking into account its integration with the real property register	1975 - 82	9,325,207
Data Bank of the Bremen Harbors GmbH & Co. KG 2800 Bremen 1	Development of applications for A) compass export III for including ship broker-, tally-, and stevedore applications, B) compass import, and C) compass export I/II (further development)	1979 - 82	5,846,730
Land Surveying Office of North Rhine-Westphalia 5300 Bonn 2 Main Department on Automating the Provincial Surveying Office of North Rhine-Westphalia 5300 Bonn 2	Automation of the surveying and mapping section of the real property register - real estate map - taking into account its integration with the real property register as a basis for the land-parcel data base	1977 - 82	6,797,200
Fraunhofer Society for the Promotion of Applied Research E.V. (FHG), 8000 Munich 19 Fraunhofer Inst. for Production Systems and Construction Technology (IPK) 1000 Berlin 30	German-Norwegian collaboration "Advanced Production System" (APS)	1981 - 85	4,448,500

Allocation Receiver, Performing Agency	Topic, Task Definition	Running Time Beginning End	Total Funding in DM
TH (Technical College) Aachen, 5100 Aachen Laboratory for Machine Tools and Business Administration of the TH Aachen 5100 Aachen	German-Norwegian collaboration advanced production systems (APS)	1981 - 85	5,877,836
German Research and Experimental Institute for Air and Space Travel E.V. (DFVLR) 5000 Cologne 90 Main Department for Central Data Processing of the DFVLR, 8031 Wessling	Functional association between Siemens Transdata and IBM SNA 3-computer networks - Snatch	1980 - 83	7,946,766
Senator for Science and Research of the Province of Berlin, 1000 Berlin 19 Large Computer Center for Science in Berlin (GRZ) U.A., 1000 Berlin 31	Planning, development, and implementation of interfaces and logs for connecting large computers, data stations, and terminal concentrators to an X.25 transport system, setting up a network for the purpose of functional association	1977 - 83	6,550,056
Association of German Computer Centers E.V.(VDRZ) 3000 Hannover 1	Pilot applications of the public data packet service for a connection between service computer centers and computer center customers	1979 - 82	8,207,483
Agency for Science and Research of the Free and Hanseatic City of Hamburg, 2000 Hamburg 76 Computer Center of the Uni Hamburg 2000 Hamburg 13	Reequipment of the computer center of the Uni Hamburg (Regional Computer Center) with a Siemens 7.882 system and a Siemens 6.640/6.610 terminal network	1981 - 82	18,164,820
Fraunhofer Society for the Promotion of Applied Research E.V. (FHG), 8000 Munich 19 Fraunhofer Inst.for Solid State Technology (IFT) 8000 Munich 60	Investigations on x-ray lithography by means of synchrotron radiation	1977 - 83	8,486,386
Fraunhofer Society for the Promotion of Applied Research E.V. (FHG), 8000 Munich 19 Fraunhofer Inst.for Solid State Technology (IFT) 8000 Munich 60	Investigations on x-ray lithography by means of synchrotron radiation	1982 - 83	6,856,000
Fraunhofer Society for the Promotion of Applied Research E.V. (FHG), 8000 Munich 19 Fraunhofer Inst.for Solid State Technology (IFT) 8000 Munich 60	Construction and preparation of working foundations for a laboratory for sub-micron technology at the Berlin Electron Storage Ring	1982 - 85	28,548,900

Allocation Receiver, Performing Agency	Topic, Task Definition	Running Time Beginning End	Total Funding in DM
Siemens AG 8000 Munich 80	Development of VLSI memory components	1980 - 85	38,100,625
Siemens AG 8000 Munic 80	New architectural characteristics and basic components for VLSI processors	1981 - 84	16,106,406
Siemens AG 8000 Munich 80 Business Area on Components of Siemens AG 8000 Munich 80	Development of simulation methods and investigation of fine structure effects for VLSI-MOS technology	1981 - 85	5,887,238
Siemens AG 8000 Munich 80 Business Area on Components of Siemens AG 8000 Munich 80	Development of CMOS-GATE-ARRAYS and cell components with their associated design methods	1982 - 85	18,345,529
Association of German Engineers (VDI) 4000 Duesseldorf 1 VDI Technology Center, 1000 Berlin 30	Improvement in the utilization of new technologies (with emphasis on microelectronics) by small and medium businesses	1981 - 84	12,919,761
Association of German Engineers (VDI) 400 Duesseldorf 1 VDI Technology Center, 1000 Berlin 30	Special program on the application of microelectronics (project staff costs)	1982 - 84	39,756,251
Siemens AG, 8000 Munich 80	Flat display screen	1980 - 82	12,940,220
Heinrich-Hertz Institute for Communication Technology Berlin GmbH (HHI), 1000 Berlin 10	Task definition and annual working program 1982, see Appendix Tasks of the HHI: General foundations of communications technology, systems technology, video and audio technology; technologies of message transmission and relaying, especially optical communication technology; integrated optics; terminal engineering and ergonomics; scientific analyses for telecommunications development. Yearly working program 1982: Intensification of research work in the area of optical communications technology and of high-resolution television; build-up of the technological area of integrated optics. Development of novel broadband communication services; analyses of forecasts for telecommunication (among others display screen text auxiliary study for the Senate of Berlin)	1982	7,862,000

Allocation Receiver, Performing Agency	Topic, Task Definition	Running Time Beginning End	Total Funding in DM
Siemens AG . 8000 Munich 90 Research Laboratories of Siemens AG 8000 Munic 83	Optical transmitter and transmitter modules	1982 - 84	5,940,387
Siemens AG 8000 Munich 80 Business Area on Components of Siemens AG 8000 Munich 83	Optical transmitter and transmitter modules	1982 - 84	6,557,202
AEG Telefunken Cable Plant AG Rheydt 4050 Moencher-Gladbach 2	A process for large-scale production of gradient profile fibers and monomode fibers	1982 - 84	8,166,116
AEG Telefunken Communications Engineering GmbH 7150 Backnang Research Institute Ulm of the AEG Telefunken 7900 Ulm	Optical transmission and receiving elements for the wave-length range between 1.2 and 1.6 microns, preferably at 1.3 microns.	1982 - 84	7,655,000
Siemens AG 8000 Munich 2 Business Area on Components of Siemens AG 8000 Munich	Highly integrated circuits for communications technology	1979 - 83	7,603,813
Siemens AG 8000 Munich 80 Business Area on Components of Siemens AG 8000 Munich 80	Circuits of microelectronics for the area of technical communication	1982 - 85	8,808,710
Standard Electric Lorenz AG (SEL) 7000 Stuttgart 40	Methods for economical glass-fiber production	1982 - 84	9,420,230
Heinrich-Hertz Institute for Communications Technology Berlin GmbH (HHI) 1000 Berlin 10	High resolution display of colored movies	1981 - 84	7,035,700
Heinrich-Hertz Institute for Communications Technology Berlin GmbH (HHI) 1000 Berlin 10	Multi-subscriber broad-band dialogue system	1980 - 83	12,492,900

Allocation Receiver, Performing Agency	Topic, Task Definition	Running Time Beginning End	Total Funding in DM
Heinrich-Hertz Institute for Communications Technology Berlin GmbH (HHI) 1000 Berlin 10	Multi-subscriber system for interactive broad-band communication systems	1979 - 82	8,719,778
AEG Telefunken Systems Engineering AG 7900 Ulm Business Area on High Frequency Technology of the AEG Telefunken Systems Engineering AG 7900 Ulm	Auto emergency radio Phase III	1978 - 82	7,756,635

Grants in Aviation Technology

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/Excerpts/

Allocation Receiver, Performing Agency	Topic, Task Definition	Running Time Beginning End	Total Funding in DM
German Research and Testing Institute for Air and Space Travel E.V. (DFVLR) 5000 Cologne 90	Defense-department portion for operation (see Appendix for task definition and annual working program 1982)	1982	48,394,500
German Research and Testing Institute for Air and Space Travel E.V. (DFVLR) 5000 Cologne 90	Defense-department portion for investment (see Appendix for task definition and annual working program 1982) Task Definition: Implementation of tasks in the areas of air and space research, exploration-, energy-, and propulsion-technology, and of traffic and communication systems; implementation of project support and services; undertaking tasks of project promotion through the area for project management under the authorization of the Federal Ministry for Research and Technology. Yearly working program 1982: The tasks are formulated in medium-term programs and concentrate on the following research emphases: A) traffic and communication systems; B) aircraft technology; C) space technology; D) exploration technology; E) energy and propulsion technology; F) program-preparatory and supplementary R&D projects; G) technology transfer for new technologies	1982	7,700,000

Allocation Receiver, Performing Agency	Topic, Task Definition	Running Time Beginning End	Total Funding in DM
Messerschmitt-Boelkow-Blohm GmbH (MBB) 2103 Hamburg 95 Business Area for Transport and Traffic Aircraft (UT) of the MBB 2103 Hamburg 95	Development and testing of a lateral tail-section box for the Airbus in composite-fiber construction - Phase III	1982 - 84	16,251,472
VFW United Aircraft Works GmbH 2800 Bremen 1	Integrated wing-propulsion system for traffic vehicles - Phase II	1981 - 83	10,484,092
VFW United Aircraft Works GmbH 2800 Bremen 1	Development of a technology for extending the useful load and missions of uture aircraft of the Airbus family	1982 - 84	5,602,940
Dornier GmbH 7990 Friedrichshafen	Technological manager for the investigation of the capabilities of amphibian aircraft - Phase II	1980 - 84	37,514,274
Messerschmitt-Boelkow-Blohm GmbH (MBB) 8012 Ottobrunn	Technology of novel dynamical systems for rotary wing aircraft	1981 - 84	16,877,718
MTU Engine and Turbine Union Munich GmbH 8000 Munich 50	Development and testing of a gas generator of novel technology for airborne propulsion systems of medium power	1982 - 86	20,502,450
German Research and Testing Institute for Air and Space Travel E.V. (DFVLR) 5000 Cologne 90 Institute for Flight Management of the DFVLR 3300 Braunschweig	Development, construction, and testing of a surveying device for components of the DAS system	1979 - 82	6,834,370
Standard Electric Lorenz AG (SEL) 7000 Stuttgart 40	DAS program: POME planning, coordination, preparation for testing, development of modules, integration and tests	1980 - 83	5,958,472
Standard Electric Lorenz AG (SEL) 7000 Stuttgart 40	DAS - Onboard unit (coordination, development of modules, integration test as well as supporting activities)	1980 - 83	7,713,316
VDO Aircraft Devices Plant Alolf Schindling GmbH 6000 Frankfurt 50	Development of an airborne display system for civil aircraft consisting of a flexible grid symbol generator and CRT grid displays for monochromatic and multicolor symbol displays	1979 - 82	5,664,110
National Air and Space Travel Laboratory NL- Amsterdam/Netherlands	Preliminary design phase for the European ultrasonic wind tunnel (ETW)	1978 - 83	5,094,564

Grants in Robotics, FMS

Bonn BMFT FOERDERUNGSKATALOG 1982 in German July 1983 pp 515-543

[Excerpts]

Allocation Receiver, Performing Agency	Topic, Task Definition	Running Time Beginning End	Total Funding in DM
TH Aachen (Aachen Technical College) 5100 Aachen Laboratory for Machine Tools and Business Administration - Chair for Production Systematics of the TH Aachen 5100 Aachen	Systematics on the design of flexible production lanes	1982 - 84	281,000
TH Aachen 5100 Aachen. Laboratory for Machine Tools and Business Administration - Chair for Production Systematics of the TH Aachen 5100 Aachen	Studies of the possibilities, preconditions, and requirements for using electronic data processing in the planning of flexible production lanes	1982 - 83	87,000
Burr GmbH 7141 Freiberg	Development and production of a prototype for a flexible production system in modular construction for workpieces of machining production up to 250 mm cubed	1980 - 82	315,400
Fraunhofer Society for the Promotion of Applied Research E.V. (FHG) 8000 Munich 19 Fraunhofer Institute for Production Systems and Production Engineering (IPK) 1000 Berlin 30	Flexible production cell to fabricate drilling tools	1981 - 82	167,000
Guehring Kg, Gottlieb 7470 Albstadt 1	Flexible production cell for fabricating spiral drills of 6 - 15 mm diameter	1981 - 82	591,000
Machine Factory Diedesheim GmbH	Modular, flexible machine design for small and medium lot production	1980 - 82	1,565,500
Bosch GmbH, Robert 7000 Stuttgart 1	Development of a swivel-armrobot for assembly	1982 - 85	702,395

Allocation Receiver, Performing Agency	Topic, Task Definition	Running Time Beginning End	Total Funding in DM
Society for Digital Automation MBH 8000 Munich 45	Development of an industrial robot for arc welding	1982 - 83	456,665
Jungheinrich Business Administration KG 2000 Hamburg 70	Modular industrial robot system with economical, problem-oriented, configurable and programmable control section for use in highly flexible assembly lines	1982 - 84	1,067,969
Kuka Welding Systems & Robots GmbH 8900 Augsburg	Development of a flexible assembly station with a freely programmable industrial robot	1982 - 84	2,867,631
Mauser Works Oberndorf GmbH 7238 Oberndorf	Components for measurement robots	1982 - 84	535,000
Peter Uhren GmbH 7210 Rottweil 7210 Rottweil	Development of a commissioning robot for small symmetric parts	1982 - 84	1,150,000
Reis GmbH & Co. KG, W. 8753 Obernburg	A device and electronic control for directly programming positions, tracks and process speeds on industrial robots by manually guiding power-operated motions	1980 - 82	483,200
TH Aachen 5100 Aachen Laboratory for Machine Tools and Business Administration of the TH Aachen 5100 Aachen	Further development of the robot off-line programming systen ROBEX and practical introduction	1982 - 84	410,000
Traub GmbH & Co., Hermann 7313 Reichenbach	Integrated flexible workpiece handling system for CNC automatic lathes of small-to-medium construction size - abbreviation FHS	1981 - 83	463,999
Uni Karlsruhe 7500 Karlsruhe 1 Institute for Information Science III of the Uni Karlsruhe 7500 Karlsruhe 1	Programming of sensor-guided assembly robots	1982 - 83	354,000
Fraunhofer Society for the Promotion of Applied Research E.V. (FHG), 8000 Munich 19 Fraunhofer Institute for Production Engineering and Automation (IPA) 7000 Stuttgart 80	Control of flexible production systems by multi-coordinate measurement units	1982 - 84	285,000

Allocation Receiver, Performing Agency	Topic, Task Definition	Running Time Beginning End	Total Funding in DM
Maho Machine Tool Construction Babel & Co. 8962 Pfronten	Workpiece measurement on machine tools/development of marketable system components	1981 - 83	317,447
Zeiss, Carl 7082 Oberkochen	Control of flexible production systems by multi-coordinate measurement units	1982 - 83	225,000
Gear Wheel Factory Friedrichshafen AG 7990 Friedrichshafen	Transformation of working conditions by linked production system with modular structure	1979 - 84	6,609,571
Fraunhofer Society for the Promotion of Applied Research E.V. (FHG) 8000 Munich 19 Fraunhofer Institute for Production Engineering and Automation (IPA) 7000 Stuttgart 80	Novel production systems for complex, thin-walled workpieces (flexible sheet-metal parts production)	1982 - 83	202,500
Translift Society for Lifting and Conveying Systems MBH 7889 Grenzach-Wyhlen 2	Standardized suspended conveyor networks for flexible production	1981 - 83	496,939
Zeiss, Carl 7082 Oberkochen	Setting up a pilot plant for a flexible production to fabricate prismatic workpieces of fine-mechanics	1981 - 83	325,000
Institute for Applied Organization Research GmbH (IFAO)	Construction of novel organization and work-place designs for the users of CNC machine tools	1982 - 83	406,000
Nuclear Research Center Karlsruhe GmbH (KFK) 7500 Karlsruhe 1	Support of technology transfer in the program of production engineering (project staff costs)	1981 - 83	5,470,001
Nuclear Research Center Karlsruhe GmbH (KFK) 7500 Karlsruhe 1	Production Technology (Project staff costs)	1979-82	9,227,879

Grants in Space Research, Satellites

Bonn BMFT FOERDERUNGSKATALOG 1982 in German July 1983 pp 565-602

/Excerpts/

Allocation Receiver, Performing Agency	Topic, Task Definition	Running Time Beginning End	Total Funding in DM
German Research and Experimental Institute for Air and Space Travel E.V. (DFVLR) 5000 Cologne 90	Operation (for task definition and annual working program 1982 see Appendix)	1982	162,227,359
German Research and Experimental Institute for Air and Space Travel E.V. (DFVLR) 5000 Cologne 90	Investment (for task definition and annual working program 1982 see Appendix)	1982	36,194,500
German Research and Experimental Institute for Air and Space Travel E.V. (DFVLR) 5000 Cologne 90 German Research and Experimental Institute for Air and Space Travel E.V. (DFVLR) - BPT 5000 Cologne 90	Cosmic research and technology (project staff costs)	1982	15,934,300
European Space Organization (ESA) F- Paris/France	Contributions to the European Space Organization (ESA), Paris/France	1982	335,972,823
German Research and Experimental Institute for Air and Space Travel E.V. (DFVLR) 5000 Cologne 90 German French Project Management of the DFVLR 8000 Munich 2	Project management of the German-French radio satellite project (TV-SAT / TDF 1)	1981 - 82	1,698,271
German Research and Experimental Institute for Air and Space Travel E.V. (DFVLR) 5000 Cologne 90 German-French Project Management of the DFVLR 8000 Munich 2	Project management of the German-French radio satellite project (TV-SAT / TDF 1)	1982	2,952,058
Eurosatellite GmbH 8000 Munich 22	Development and production of the German and French radio satellite TV-SAT and TDF-1, preliminary contract	1981 - 85	270,039,000
Industrial Systems Operating Co. MBH (IABG) 8012 Ottobrunn	Coalescence of 3M-WSA and ISA/TVA and erection of a space simulation system/thermovacuum system (WSA/TVA)	1980 - 83	14,396,121

Allocation Receiver, Performing Agency	Topic, Task Definition	Running Time Beginning End	Total Funding in DM
Siemens AG 8000 Munich 70 Business Area on Long-Distance Travel Technology of Siemens AG 8000 Munich 70	Component project for earth radio stations for a future communication satellite in the frequency range 11/14 GHZ	1976 - 82	282,051
Siemens AG 8000 Munich 70 Business Area on Long-Distance Travel Technology of Siemens AG 8000 Munich 70	Component project for earth radio stations for a future communication satellite in the frequency range 11/14 GHZ	1976 - 82	241,861
Societe Arianespace F- Evry/France	Ordering an Ariane launch for TV-SAT	1981 - 85	63,131,390
Standard Electric Lorenz AG (SEL) 7000 Stuttgart 40	Development of a video transmission device for radio and commentary audio channels	1976 - 82	848,328
Telefunken Video and Radio GmbH 3000 Hannover 91	Digital wide radio receiver for TV-SAT	1981 - 82	911,131
Standard Electric Lorenz AG (SEL) 7000 Stuttgart 40 Business Area on Defense and Air Travel of the SEL 7000 Stuttgart 40	Development and production of experimental equipment for the NAVEX flight model	1981 - 85	9,975,352
Dornier System GmbH 7990 Friedrichshafen	Development, construction, and test of a microwave remote sensing experiment	1977 - 82	23,981,281
Messerschmitt-Boelkow-Blohm GmbH (MBB) 8000 Munich 80 Business Area on Space Travel of the MBB 8000 Munich 80	Modular opto-electronic multi-spectra scanner including playback unit for magnetic tape M14L	1980 - 84	8,752,591
Dornier System GmbH 7990 Friedrichshafen	Funding project on material-science experiments - double rack for experimental modules and the Medea system	1981 - 84	13,621,786
Erno Space Travel Technology GmbH 2800 Bremen 1	German payload contributions to Eureca	1982 - 83	119,125

Allocation Receiver, Performing Agency	Topic Task Definition	Running Time Beginning End	Total Funding in DM
Erno Space Travel Technology GmbH 2800 Bremen	Preparation of ten mouse modules for the Mouse Project	1979 - 85	12,769,460
Erno Space Travel Technology GmbH 2800 Bremen 1	TEXUS V/VI construction of an experimental payload consisting of four flight units with a reserve module including total integration and campaign	1981 - 83	5,672,218
Erno Space Travel Technology GmbH 2800 Bremen	Project Spacelab Mission D 1, payload integration - Phase C/D	1982 - 85	38,182,688
Kayser -Threde GmbH, Erwin 8000 Munich 70	Development and construction of the payload element Medea for the D1 mission	1981 - 84	8,415,129
National Aeronatics and Space Administration (NASA) USA- Washington/USA	Implementation of the first German spacelab Mission D 1 (Technology Laboratory), here: furnishing the required starting services of the NASA Space Transportation System by NASA	1982 - 85	113,575,000
Sahm, P.R., Professor Dr. Eng. 5100 Aachen	Advances with metal and composite materials by the application of space conditions	1981 - 82	48,888
Max-Planck Society for the Promotion of Science E.V. (MPG) 8000 Munich 1 Max-Planck Institute for Aeronomy 3411 Katlenburg-Lindau 3	Development of a telescope camera to fly on the ESA space probe Giotto in order to investigate the Halley comet	1982 - 85	7,394,000
Max-Planck Society for the Promotion of Science E.V. (MPG) Max-Planck Institute for Nuclear Physics 6900 Heidelberg 1	Development and construction of a dust mass spectrometer PIA for the ESA comet mission Giotto	1982 - 85	8,088,000
Max-Planck Society for the Promotion of Science E.V. (MPG) 8000 Munich 1 Max-Planck Institute for Nuclear Physics 6900 Heidelberg	Measurement of the chemical and isotopic composition and of the energy distribution of gases and ions with the NMS experiment on the Giotto comet probe of ESA	1982 - 85	5,341,000

Allocation Receiver, Performing Agency	Topic Task Definition	Running Time Beginning End	Total Funding in DM
Max-Planck Society for the Promotion of Science E.V. (MPG) 8000 Munich 1 Max-Planck Institute for Nuclear Physics 6900 Heidelberg	Development of the dust experiment for the Jupiter Orbiter Probe Mission of NASA	1977 - 84	6,185,338
Max-Planck Society for the Promotion of Science E.V. (MPG) 8000 Munich 1 Max-Planck Institute for Physics and Astrophysics - Institute for Extra-terrestrial Physics 8046 Garching	Investigation of plasma transport from the solar wind into the magnetosphere by means of artificially introduced plasma clouds	1980 - 84	10,876,500
Messerschmitt-Boelkow-Blohm GmbH (MBB) 8000 Municy 80 Business Area on Space Travel of the MBB 8000 Munich 80	1. Implementation of modifications, production, and acceptance tests of 400 N and 10 N propulsion systems for project JOP-RPM. 2. Preparation, and holding in readiness of fuels for project JOP-RPM	1977 - 83	42,550,169
Royal Norwegian Council for Scientific and Industrial Research (NTNF) N- Oslo/Norway Space Activity Division N- Oslo/Norway	Agreement of cooperation for the Bugatti II payloads, Trinom II payloads and Hero payloads	1978 - 84	6,039,440
Dornier System GmbH 7990 Friedrichshafen	X-ray satellite system definition - Phase B2	1982 - 83	8,640,570
Max-Planck Society for the Promotion of Science E.V. (MPG) 8000 Munich 1 Max-Planck Institute for Physics and Astrophysics - Institute for Extra-terrestrial Physics 8046 Garching	X-ray satellite focal instrumentation part 1: engineering model and operating unit	1980 - 87	9,601,700
Messerschmitt-Boelkow-Blohm GmbH (MBB) 8000 Munich 80 Business Area on Space Travel of the MBB 8000 Munich 80	Cooled infrared laboratory Girl, implementation of a system and mission analysis. Development, construction, and space-travel qualification of the QM, improvement of the QM up to a flight model, implementation of acceptance tests	1978 - 83	21,333,961

Allocation Receiver, Performing Agency	Topic Task Definition	Running Time Beginning End	Total Funding in DM
Zeiss, Carl 7082 Oberkochen	Rosat Mirror System: production of the individual mirrors of the flight model up to x-ray optical acceptance	1982 - 85	6,419,329
Erno Space Travel Technology GmbH 2800 Bremen 1	Process chamber experiments	1982 - 84	7,699,454
Kayser-Threde GmbH, Erwin 8000 Munich 70	Development and construction of the training model and of the flight unit for the integrated experimental system for Spacelab Experiment 1 ES 201	1978 - 83	10,256,362
German Research and Testing Institute for Air and Space Travel E.V. (DFVLR) 5000 Cologne 90 German Research and Testing Institute for Air and Space Travel E.V. (DFVLR) 8031 Wessling	Project-specific operating costs for the preparation and deployment of a data management system for user support in the spacelab missions	1979 - 82	5,553,000
Messerschmitt-Boelkow-Blohm GmbH (MBB) 8000 Munich 80 Business Area on Space Travel of the MBB 8000 Munich 80	Space shuttle mission SPAS-01	1979 - 83	16,787,385
M.A.N. Machine Factory Augsburg-Nuremberg AG 8000 Munich 50 M.A.N. Business Area on New Technology 8000 Munich 50	Ariane carrier technology program adjoint to construction	1980 - 82	1,500,000
Messerschmitt-Boelkow-Blohm GmbH (MBB) 800 Munich 80 Business Area on Space Travel of the MBB 8012 Ottobrunn	Ariane carrier technology program adjoint to construction	1980 - 82	580,000
AEG Telefunken Communications Technology GmbH 7150 Backnang	Preliminary development activities to adapt the TV-SAT EPC to UNISAT and rebuilding two travelling wave tube amplifiers for COMSAT	1982 - 83	750,000
AEG Telefunken Communications Technology GmbH 7150 Backnang Business Area on Long-Distance Traffic and Cable Technology of the AEG Telefunken Communications Technology GmbH 7150 Backnang	Development of modules for the 20/30 GHZ payload of a satellite for propagation and transmission experiments	1980 - 83	2,279,661

Allocation Receiver, Performing Agency	Topic Task Definition	Running Time Beginning End	Total Funding in DM
AEG Telefunken Communications Technology GmbH 7150 Backnang Business Area on Long-Distance Traffic and Cable Technology of the AEG Telefunken Communications Technology GmbH 7150 Backnang	Development of a 20 GHZ modulator for the 20/30 GHZ payload of a satellite for propagation and transmission experiments including the required converter for test equipment	1980 - 82	1,007,041
Messerschmitt-Boelkow-Blohm GmbH (MBB) 8000 Munich 80 Business Area on Space Travel of the MBB 8012 Ottobrunn	Long-term qualification of the propulsion system technology for an interplanetary mission (GALIEO), such as is used in Symphonie	1977 - 82	2,261,360
Messerschmitt-Boelkow-Blohm GmbH (MBB) 8012 Ottobrunn Business Area on Space Travel of the MBB 8012 Ottobrunn	Fully electronic satellite image recording unit: construction of the second module as well as of the interface electronics for the data acquisition system	1979 - 82	868,709
Messerschmitt-Boelkow-Blohm GmbH (MBB) 8012 Ottobrunn Business Area on Space Travel of the MBB 8012 Ottobrunn	Fully electronic satellite picture recording unit	1978 - 82	1,255,002
Industrial Systems Operating Company MBH (IABG) 8012 Ottobrunn	Operating contract 1982 including adaptation measures to the state of the art (title 104 and 103 B)	1982	6,400,000

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CSO: 3698/220

AEG TELEFUNKEN REORGANIZES RESEARCH FACILITIES IN FRG

Bern TECHNISCHE RUNDSCHAU in German 22 Nov 83 p 41

[Article by Hans Gissel: "AEG-Telefunken: Research and Development"]

> [Text] The company's new structure and concentration on specific task areas also affect research and development. In the previous organization, the AEG Research Institutes in Berlin, Ulm, Frankfurt and Kassel were associated with different areas of the company. Today, research is consolidated in a single area. In the course of this retrenchment measure, the tasks of the Research Institute in Kassel were transferred to Frankfurt and the concern's research topics focused on today's work areas.

Whereas past investments were concentrated on instruments and test equipment, they are now increasingly shifted to intelligent, computer based systems. The accelerating technology generation change makes ever shorter development times necessary and places higher requirements on development efficiencies. Thus, routine work has to be taken over by machines to free researchers and developers. Efficient tools have to be put into their hands to amplify their effectiveness as they involve themselves with their real creative tasks.

CAE has the potential to aid them in realizing this goal. In addition to time savings, the use of CAE provides advantages like higher quality, flexibility in making subsequent changes and expansions, improved transition from development to production and above all faster and better documentation. CAE includes CAD, CAM and also software engineering.

Technical development is not only moving into discrete activities like computer-based, automated circuit board design but also into setting up systems with primarily technical data flow which however can access business and materials data banks through on-line computer connections.

Some areas of application for CAE are:

--circuit board design
--integrated-circuit design

--wiring diagram layout
--mechanical design
--finite element analysis
--facilities construction
--architectural layout
--software development
--general technical-scientific applications

The design of circuit boards using CAE systems is today a tested and proven methodology which is also applied in many other areas. For the development of modern LSI circuits, efficient CAE systems, especially those with the required simulation capability, are a necessary prerequisite. Our design center at the Ulm Research Institute and Telefunken Electronic GmbH (TEG) have such systems.

CAE Applications in Software Development

In wiring-diagram layout for facilities construction, the application of CAE plays an important role. For this purpose, AEG Telefunken Software Engineering (AST) and our central division "Data Processing" have developed a system called RUPLAN which can also be applied in the manufacturing area. Seven areas in the company are already using this relatively new system.

In mechanical design, finite element analysis, facilities construction and architectural layout, commercially available systems have been installed in 12 areas. A characteristic is the very broad list of requirements covered, ranging from precision mechanics all the way to turbine construction. A focal point in CAE application is the improvement of effectiveness and quality in software development. In view of the continuously increasing proportion of software in the development and project engineering of new products and systems, the solution of this problem is of critical importance for future competitive capability. Our subsidiary, ATM Computer, together with AST and users from the facilities area, developed the AMDES software development system. Based on the well known UNIX operating system, AMDES creates a uniform, efficient and especially user-friendly environment for the development of all types of engineering and technical-scientific software. During the past year we have set up about 120 AMDES work stations in 13 areas.

In addition, AST has developed the COMPASS software-design system which supports software development from analysis through program design and coding. Naturally, COMPASS is integrated in AMDES. Both systems are suitable for use with mini and microcomputers. Even though these are very recent developments which have not been in use very long, they clearly show advantages which are expressed through high acceptance by software developers.

Research Focal Points at AEG-Telefunken

In order to hold and expand in the future the leading technological position in the markets considered important to the company, AEG-Telefunken is concentrating its research on certain key areas, including the following:

--automation systems
--pattern recognition
--optical communications technology
--millimeter wave technology
--solar technology
--modern power systems
--modern household equipment technologies

The innovative power of AEG-Telefunken is shown in part by the fact that our company holds over 10,000 patent rights at home and abroad and has license-exchange agreements with most large European manufacturers in the electronics industry. In the area of communications technology alone, we will apply for 50 percent more patents in 1983 than in 1980.

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CSO: 3698/212

SCIENTIFIC AND INDUSTRIAL POLICY

FRANCE TAKES STEPS TO PROMOTE INDUSTRIAL RESEARCH

Paris AFP SCIENCES in French 8 Dec 83 pp 1-4

[Article: "Scientific Research Policy and Organization"; passages enclosed in slantlines underlined]

[Text] /Incentives to Industrial Research/

A series of measures will be or have already been adopted by the government to develop industrial research in France; this was emphasized by Mr Laurent Fabius, minister of industry and research, who was the honor guest at the annual banquet of the National Technical Research Association (ANRT) on 6 December.

Recalling that the state's role is "essentially to provide incentives" and that "it should not substitute itself for entrepreneurs," the minister listed the efforts made by his ministry, as follows:

"I have asked for modifications in the procedures of intervention of the Research and Technology Fund in order to make more efficient use of its appreciably increased budget. Thus, already in 1984, the decisions I made will lead to a /doubling/ of the credits allocated to enterprises. In absolute value, this will represent over 600 million francs, and in relative value over 50 percent of a budget, only 30 percent of which were spent on industrial research in 1983."

"We shall also /double/ the Research Fund credits that will be decentralized and managed by the DRRTs [General Directorates of Technical Research]. This is designed to orient public financing toward regional small and medium-size enterprises. To ensure the correct implementation of these measures, I asked for a simplification of the procedures to increase their incentive character, especially through improved credit-payment schedules."

"- As far as public credits are concerned, cooperation with the industry will be taken as a criterion in granting budget credits to large research organizations. On several accounts, this criterion can be used in all scientific research sectors."

"- Operating contracts with large national enterprises will include a 'Research and Development' section. The realization of the objectives indicated in these operating contracts and the potential for technology transfer to small and medium-

size enterprises will represent a major criterion in assessing the results obtained by these enterprises."

"- The Ministry of Industry and Research will make it a point to encourage associative technical research by groups of enterprises, technical centers, engineering schools and universities."

"- Generally speaking, we shall try to privilege measures like the research tax-credit, which stimulate the independent effort of enterprises as the incentive provided is given automatically."

"To boost industrial research, we must also achieve a closer connection between research and industry. Three orientations deserve special attention."

"1) We must first improve the definition and the mobility of research programs. On the one hand, the enterprises or their representatives must be able to have their say with the authorities that define public research programs. On the other hands, the State still has an exaggerated tendency to carry out research itself, through public organizations, instead of entrusting it to enterprises."

"2) We must also improve personnel mobility. The new researcher statute encourages enterprises to delegate their personnel and place it at the disposal of others. A researcher leaving a public research organization to create an enterprise might even be assured of being given back his job should he need it."

"3) Finally, and above all, training remains inadequate and should be improved. Certainly, we lack engineers, but in addition training through research is too often the case in the industry: 2 percent of the 35,000 industrial research engineers were initially trained through research. The ANRT is well aware of the CIFRE [expansion unknown] grants since it manages them: /their number will double in 1984./ I see this as a confirmation of your efforts, as these grants are an effective and valued tool of cooperation between research and industry."

Mr Fabius also emphasized the important part that research management should play in enterprises. "It is not enough to have research, it must not be kept apart from the enterprise's major strategic decisions," he pointed out. And the minister went still one step further when he implied that it would be a good thing if, once in a while, a researcher would get to manage an enterprise. "Thus," he pointed out, "in neighboring countries it is far more frequent to see a researcher become the manager of a large chemical or pharmaceutical group."

For his part, Mr /Guy Denielou,/ ANRT president, pleaded in his speech for the freedom of technical research.

"Technical research needs a lot of flexibility and freedom. Strategy in this respect has no meaning unless tactics are given free rein," he emphasized.

Referring to case histories, Mr Denielou said he was pleased by a number of past or present initiatives and efforts.

For instance, "in hindsight," the reform of the ANVAR [National Agency for the Implementation of Research] appears to him to be "the model of a successful

effort." The agency "fulfills quite well the conditions of flexibility and decentralization that I mentioned earlier. It actually distributes more credits than it uses. Its regional delegates have acquired a pleasant reputation. We hope that the Industrial Modernization Fund (whose objective obviously goes far beyond the ANRT objectives without being completely different from them) will be a clear success."

The CIFRE contracts--which are managed by the ANRT--are another positive example. "Initially an idea of Mr Dejou, the CIFRE contracts were implemented rapidly and are becoming increasingly popular. We have shown that serious [work] was compatible with administrative flexibility. We were able to follow a policy in accordance with the principles I just outlined: actually, a CIFRE contract means first of all that one person, one enterprise and one laboratory have already agreed. The value of a case depends as much on their agreement as on the intrinsic quality of each of the individual partners. Similarly, approval of a case does not depend only on its quality, but also on all the allocations that have already been made and the bulk of current applications. Therefore, although we are using a fairly reliable assessment system, you can see that there is absolutely no grading of the applications. Mr Minister, may I express the wish that you will help us develop further a system which, although it is not highly structured, has already reached a significant number of individuals. And we do hope to achieve this both in our regions and in Europe.

"May I quote here just one figure. /Fifty percent of the enterprises benefitting from CIFRE contracts employ less than 500 people./ In other words, the ANRT is now reaching the world of the small and medium-size enterprises directly and in all the regions. It might be time to contemplate an extension of this method to lower levels, for instance the DUT [University Technology Diploma] through what we are already calling among us the CIFRE II."

"May I also mention another fortunate decision, namely the caution exerted in tackling /the problem of technical centers, whose mission goes far beyond mere collective research./ We had recommended such caution to your predecessors, and we are pleased to see that our advice was followed. What we now wish for is some initiative in favor of collective or associative research, in which we could recognize the characteristics that made the success of the ANVAR or the CIFRE contracts. For we should insist on this: technological development must be interprofessional as much as interdisciplinary. The notion of infratechnology advanced by our U.S. colleagues appears to be very pertinent in this case. The ANRT is now studying such a set of themes (absorption, filtration, these are two examples we have in mind)."

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FRANCE WANTS TO MAKE TOULOUSE NEW 'SILICON VALLEY'

Paris LE NOUVEL ECONOMISTE in French 26 Dec 83 pp 50-53

[Article by Sophie Seroussi: "Toulouse 'High Tech'"]

[Excerpts] An alliance between grey matter and the rose-colored town: will the Midi-Pyrenees region become a French Silicon Valley?

Enough! Enough! Toulouse is tired of being the land of Rugby, foie gras and cassoulet! Loud and clear, it is claiming the title of European capital of the future. At a time when the future is erupting in factories, offices, books and even political speeches, the capital of the Southwest is keeping the score.

Where are the Airbus and the Ariane electronic brain manufactured? In Toulouse. In Toulouse also, the Paul-Sabatier University which, this year, can boast of ranking first in the French hit-parade of industrial contracts with a total of 26 million francs. Overtaking the prestigious Orsay faculty of sciences. In Toulouse also the LAAS (Automation and Systems Analysis Laboratory), the recognized French leader in robotics. Elf-Aquitaine is also establishing there its biotechnology research and development center. And the leading French small or medium-size industries selling satellite images and robotized systems, Spot-Images and Midi-Robots, were born under the Toulouse sky from an alliance between public and private research. A late technological calling, the result of the vagaries of history and decentralization rather than that of a political will.

"It is essential for Toulouse to remain one with its environment," according to Mr Jacques-Roger Machart, socialist deputy and member of the Toulouse General Council. "The situation is just ripe for the town's technological expansion. But it cannot go it alone." A graduate of Ecole Centrale [a higher engineering school] and the School of Political Sciences, this EDF [French Electric Power Company] engineer, aged 43, knows what he is talking about. For years, working through the Regional Council, he has taken an active part in the development of Toulouse. He fought to give the town an excellent financing tool, similar to the U.S. "venture capital," and one which is envied by many other regions. The IRDI (Regional Institute for Industrial Development) was created two years ago with a capital of 83.3 million francs. Its shareholders are the Regional Council, Elf-Aquitaine, the IDI [Industrial Development Institute], the Post Office Savings

Bank, and local mutual benefit societies and manufacturers. "We have a dual role," Mr Henri Perrier, general manager, explained. "To multiply the creation of enterprises using what is available locally, and to assist existing enterprises so they will come of age. Industrially speaking."

Blossoming.- And they are successful. Thanks to them, Michel Thierry, a textile manufacturer employing 500 (165 million francs in sales), successfully completed its automation. Tunet, the leading French manufacturer of hunting cartridges, successfully diversified in the sports and leisure industry. And Photosystemes, a very young company, is making a start selling "mini-labs" to develop color film automatically. In the latter case, the Toulouse consensus played to the hilt. "The technical problem was which material to choose for the system feeding the various developing baths," we were told by Mr Jugie of the National Center for Scientific Research. "My colleague at the National Agency for the Implementation of Research came to see me." Once the product was developed, the IRDI took over. The result: a laboratory costing 20,000 francs, half the price charged by Fujitsu, the Japanese company that is flooding the French market. According to Mr Daniel Esteve, director of the LAAS, the "Mr Factory Automation" of the Ministry of Research and Industry in Toulouse, it is a question of accent: "Here, we all know one another. I don't need an appointment to go talk things over with the director of MATRA Espace [Mechanics, Aviation and Traction Company]."

Dialogue and availability: thanks to them, innovating small and medium-size industries are blossoming. They are often headed by graduates from the Paul-Sabatier University, engineers from local higher schools, or researchers from the LAAS. Most of these industries choose to settle in industrial zones near university and higher-school campuses. Thus, Orion Electronic (18 million francs in sales) has been dominating the automatic cable-tester market since 1980; this is a very narrow market, but with little competition and a promising future selling instruments to the telecommunications, aerospace, aeronautics and armament industries. SOTEREM [expansion unknown] (10.5 million francs in sales) has developed a veritable robot that can see, the Lynx System, which is in a good position on the market of form-recognition devices for the nuclear industry. Less successful, SETRIC [expansion unknown], which had triggered Elf-Aquitaine's and Moet-Hennessy's enthusiasm when biotechnologies became a fad, is now suffering from growing pains and the fact that the market is not yet ripe. CEIS [expansion unknown] (35 million francs in sales, including 70 percent from export sales) was more successful; it is known through its CEIS Espace subsidiary which brought forth the "Argos" system. This electronic localization and data-collection system, which was made popular by Transatlantic races, is used for many telecommunication applications. Recently, it was installed in the Nile basin and will soon be used in the Amazon basin to explore their resources and improve their economic development. The CEIS chief executive officer, Mr Didier Bernardet, 48, who studied both engineering and business law (which is rare in France and common in the United States), has faith in the true small and medium-size industries, those which are motivated by the market, not by public subsidies: "We are fighting an economic war," he is fond of saying; "small and medium-size industries are the commandos that will open the markets to large enterprises and to France."

No one can escape the economic war. Neither Toulouse nor the other French regions. Then, behind its technological showcase, does the capital of the Midi-Pyrenees region have the means to stand the test of time? For the French "baby Silicon Valley," the harder still remains to do: growing up.

The Data-Processing Equivalent of the ECNR [European Center for Nuclear Research]

Will Toulouse be to computing what Geneva is to the atom? The people of Toulouse hope to harbor the equivalent of the ECNR by 1986: 6,000 square meters of laboratories, 250 people, financed one third each by the region and the two Ministries of Industry and Education, and exclusively devoted to scientific computing. A sort of self-service facility where European researchers could find machines and technicians, and which, together with Toulouse's university and industrial potential, especially in the field of data-processing, intends to and should become competitive with large U.S. centers. From its creation, this European data-processing Mecca should be equipped with one of the most powerful computers available on the market, with all its environment. Nowadays, from pure mathematics to biology, most scientific discoveries are made numerically, through computer simulations. However, the largest scientific computing instruments available are in the United States. Just as the ECNR made Europe one of the world leaders in particle physics, an advanced research and training center for scientific computing will provide impetus to European data-processing research. And it needs it sorely.

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FRENCH RESEARCH MINISTER DEFINES NEW CNRS POLICY

Paris AFP SCIENCES in French 5 Jan 84 pp 1-3

[Article: "Mr Fabius Defines New CNRS Policy"]

[Text] At a Cabinet meeting, on 4 January, Mr Laurent Fabius, minister of industry and research, outlined the main orientations of the policy that will now be followed by the National Center for Scientific Research (CNRS).

The largest French public research organization, employing 24,959 in 1984, the CNRS will have a 1984 budget of 7,734 million francs (compared with 7,028 million in 1983).

According to the communique published after the Cabinet meeting, the minister pointed out that "the CNRS essential mission is to further research in all fields of knowledge, and in particular basic research. It must also implement the results of its research."

"An active policy of opening and cooperation will lead to fruitful connections between research, technological development in advanced sectors, and industrial aplications."

"1) - The CNRS's cooperation with all those engaged in research will be developed," according to the communique:

"- with the universities, which will be able to sign framework-conventions with the CNRS. The amounts allocated by the CNRS to associated university groups will be maintained. The decisions leading to the creation of new associations or ending existing associations will be made together with the universities and the Ministry of National Education, and they will consider research quality and whether it reflects national priorities and respects regional balances."

"- with other research organizations: several agreements will be signed, in particular to coordinate the efforts of the CNRS and the National Institute for Data-Processing and Automation Research (INRIA) in the electronics sector, to create a microelectronics laboratory in Bagneux jointly with the National Telecommunications Studies Centers (CNET), and to create a joint aquaculture laboratory in the Charente-Maritime department jointly with the National Center for the Exploitation of the Oceans (CNEXO)."

"- with industrial enterprises: the signature of conventions such as those already existing with Saint-Gobain, EDF [French Electric Power Company], Roussel-UCLAF and Renault will be encouraged. Together with other enterprises, the CNRS may create joint laboratories, joint scientific organizations, subsidiaries."

"- with business associates: the CNRS will engage in cooperation on research themes presenting an essential interest for the labor market, such as the adoption and social impact of new technologies."

"- with the regions: conventions could be signed for several years, as was just done with the North-Pas-de-Calais and Provence-Cote-d'Azur regions. In this context, the CNRS will contribute to the development of regional research poles."

"2) - Researchers will be encouraged to change jobs if they want to."

"Procedures will be defined to help CNRS personnel move to other public research organizations and enterprises. On the other hand, the CNRS will welcome engineers from the industry and from state technical organizations in its laboratories."

"The statutes of CNRS researchers and higher school and university teachers will provide for exchanges between these two bodies."

"Exchanges of young researchers holding doctorates between the CNRS and European laboratories will be encouraged."

"Finally, the CNRS will report to the public on its operations at regular intervals and will contribute to information and scientific education through the use of the new media, in particular cable networks," the communique concluded.

At the CNRS, people point out that a Directorate for the Implementation and Applications of Research was created in December 1982 and that the budget devoted to it will increase by 45 percent this year.

During the past year, to encourage cooperation between laboratories and industries:

- 16 representations in charge of industrial relations were created in the regions;

- 3 new clubs of the industrial relations committee were created (laser, surfaces, applied mathematics) to promote the dialogue between researchers and manufacturers;

- the science and technology bank (CNRS-ANVAR [National Association for the Implementation of Research]) started the LABINFO data bank;

- finally, the CNRS-Consultant office in charge of developing the consulting activities of researchers and engineers, saw the number of its members increase from 67 to 100.

In 1983, this policy also led to the creation of eight scientific groups associating CNRS and industrial laboratories and, on 29 December, to the official creation of the first public interest group (GIP) for the development of the Time-Frequency sector, in which the CNRS, the Higher National School of Mechanics and Microtechnology and the General Electronics and Piezoelectricity Company are associated.

In September, the CNRS also created in Toulouse its first industrial subsidiary, Midi-Robots, which has a capital of 7 million francs, most of which is held by the CNRS.

Framework agreements with industrial partners were signed to start and coordinate joint operations with Saint-Gobain, CETIM [Mechanical Industries Technical Center], Pasteur-Fondation, Roussel-UCLAF, CTB [Wood Technical Center], Renault and Elf-SNEA [National Elf Aquitaine Company].

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SIEMENS OFFICIAL COMMENTS ON LAG IN FRG ELECTRONICS INDUSTRY

Stockholm SVENSKA DAGBLADET in Swedish 5 Jan 84 p IV

[Article by Kjell Brodda: "West German Computer Industry Still Behind"]

> [Text] Munich (SvD). As in Sweden, production of investment goods is a very important part of West German industry. Now it is said that they have neglected investing in branches with future prospects, such as computers--but that is of course not the entire truth.

The large electronic firms, which among other things manufacture typical investment goods such as equipment for power transmission, generators and electric motors have had a difficult time during the past recession. In addition, a declining investment pace in the industrial countries contributed to the payment problems of the developing countries and OPEC.

For several companies the "crisis" also became the alarm clock which led them to begin to reorganize and restructure. Now the electronic industry is sniffing the morning air for the first time in a long time, but they hardly expect an immediate large production increase. Domestic demand will continue to be weak during all of 1984, while exports to other industrial countries are expected to increase during the year. In one year the ceiling for capacity is supposed to be reached, and the need for investment both within and outside West Germany is therefore great.

Stable Profitability

One of the really large giants is Siemens, which had problems with profitability in the beginning of the 80's. A strong rationalization program has now, however, led to stable profitability. There have been no major closings, but they have gone in for more effective warehousing and discarding unprofitable products.

The two most problematical divisions have been electronic components and computers.

Becoming Dependent

"Components, for example integrated circuits, are a key technology," said Dr Johannes O. Delfs, advisor for economic questions at Siemens main office in Munich. "In order for us to be successful in other areas, we must control technology and hang on in the development of components. If we discontinue manufacturing we will become dependent on manufacturers in the United States and Japan.

The other unprofitable division within the Siemens firm, computers, is perhaps somewhat more surprising.

During 1983 it was calculated that production within the West German computer industry had gone up 15-20 percent; this year an increase in volume is predicted which will be at least 10 percent.

But Siemens computer division had a loss.

"Now the red figures have become black," said Dr Delfs. "Our problem was that we competed directly with IBM; those who instead invested in smaller products have had an easier time being profitable."

One of the most successful West German computer firms is Nixdorf, which invested in terminals for bank tellers, among other things.

Falling Behind?

Dr Delfs will not agree, however, that West Germany is falling behind in a branch with future prospects such as computers.

"Besides ourselves and Nixdorf, there are among others Telefunken, Kienzle and Triumf-Adler. Furthermore the large American manufacturing firms IBM, Texas Instruments and Hewlett-Packard have manufacturing and research in this country.

"If the computer industry is too small in West Germany, this is not only a West German problem, but also a European problem, since most countries in Europe have a much less developed computer industry than we have."

That the computer division has now become profitable is due in large part to Siemens having learned the importance of quality from the Japanese, according to Dr Delfs. And the importance of maintaining a high quality standard once attained.

Siemens is cooperating with the Japanese firm Fujitsu in large commercial computer systems and installations.

If the West German computer industry is too small, what could be the reason for that?

Dr Delfs believes that an important reason could be that it is so difficult to start up new expansive businesses in West Germany.

The climate is not at all as it is in the United States, where Silicon Valleys grow up like mushrooms from the ground, largely because employees of larger firms break away and start their own firms.

The innovators who, despite everything, break away have big problems finding risk capital. The banks are traditionally big lenders to West German companies, and a well-developed risk capital market is lacking.

That this is the case is reflected by the accounts of the companies--the financial soundness is at a low international level, and the amount of own capital in relation to borrowed capital has steadily declined during the past decade.

Furthermore regulation and taxes work against formation of new firms, said several bank economists.

In other words, the problem is similar to Sweden's. Traditions, taxes, shortage of risk capital and regulation place obstacles in the way of taking risks in Sweden also.

In one area, however, we are ahead. The venture capital movement which started here almost two years ago is just beginning in industrial West Germany.

(This is the last article in the series about the West German economy. The other articles were published on 2, 3, and 4 January.)

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SCIENTIFIC AND INDUSTRIAL POLICY

BRIEFS

FRENCH COUNCIL FOR ELECTRONICS--Paris: Creation of a Scientific Council for Electronics. An electronics council made up of 18 prominent personalities and presided over by Mr Maurice Nivat, professor at the Paris VII University, has just been created by Mr Laurent Fabius, Minister of Industry and Research, to investigate any scientific question which could possibly have an influence on the evolution of the electronic and data processing industries in France. The council will attempt to foster the emergence of new ideas by identifying the means to be used to translate them into concrete results. It will evaluate, in particular, the set of actions taken by the administration within the scope of the so-called "Mastering the development of the electronics industry" mobilising program. The 18 members are scientific personalities with important responsibilities in research laboratories, universities, and businesses. The secretary functions will be handled by the executive secretary of the Electronics Industry Mobilising Program. [Text] [Paris AFP SCIENCES in French 22 Dec p 6] 6445

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MYSTERIOUS EAST BLOC DEALS OF HERR MUELLER

Bonn DIE WELT in German 21 Dec 83 p 4

[Article by Hermann Renner: "The Mysterious East Bloc Deals of Herr Mueller"]

> [Text] Business involving the computer is flourishing--and not only in the lawful area. The problem of demarcation between electronic equipment that can be used purely economically or also militarily has drawn the attention of international spy circles to this lucrative business. The US Customs Service alone has reported over 350 cases since 1981 for legal investigation. So far there have been 211 convictions. Recently, delivery of the American VAX 11/782 computer system to the Russians was stopped at the last second with the help of German customs. The example of the VAX 11/782--Moscow could improve the accuracy of its missiles with this system--demonstrates the methods being used today in this "business."

On 20 November the telephones were ringing in the sleepy Sunday stillness of the free port of the south Swedish town of Hälsinborg. Stockholm, Hamburg and Bonn, the English and the Americans were on the other end of the line. Swedish customs were supposed to confiscate three containers which had arrived the day before with the domestic freighter "Elgaren."

The punctilious officials proved to be intractable. They said it was not possible without a judge's order and they could not find a judge quite so quickly. On Monday, the 21st, the neutral nothern countries were enlightened. Carl-Johan Aaberg, undersecretary of state in the Swedish Ministry of Foreign Trade stated in reply to a question from United Press International that the containers were now under guard and could not leave Sweden for the time being.

The frantic activity on the telephone was one of innumerable skirmishes in the underground war between the US security services, to whom Western customs authorities lend a more or less willing hand, and businessmen working internationally who, for their part, are controlled by Eastern services or who earn a living from them. Enormous sums are at stake. The dealers deliver prohibited high technology by hazardous circuitous routes to the Soviet Union. And Germans occupy a leading position in this business.

The containers taken into custody in Sweden hold a complete VAX 11/782 computer, an electronic guidance system especially for missiles, which the Soviets cannot presently match in quality. The system can be exported from the United States only with special permission from the customs authorities--in fact, from the Pentagon.

The fact that it travelled as far as southern Sweden in spite of that is due to the creativity of an obviously unusual north German who, under the name of Mueller, is keeping the nose of the FBI, the CIA, British MI5 and, naturally in a subordinate role, the Federal Intelligence Service busy--without there having been a trial so far or even an arrest.

To understand this one needs to know that, since the beginning of the cold war and since it realized that the development of the Soviet atomic bomb and rapid Russian advances in the area of space travel rest in large measure on the use of Western, mainly American, technology, the United States is trying to put obstacles in the way of this kind of communist "scrounging."

In the course of time the list of "strategic goods," whose export to nations of the East bloc is forbidden, became longer. And since, in the computer age, it is very difficult to distinguish between what can serve civilian purposes and what can possibly serve military purposes, larger and larger areas of the most advanced technology in particular were added to the embargo lists.

Because on the other hand the Western world is directed in principle towards the free traffic of goods and knowledge, because innovation and creativity are regarded as constituent elements, tensions soon arose--and they will last as long as the two systems are irreconciliably opposed.

In order to guarantee to some extent the exchange with the advanced countries of Europe and Asia and still to rein in the area of dominance of the Warsaw Pact, a gremium was installed in Paris in the 1950s whose publicity is in inverse proportion to its actual influence: the "Coordinating Committee for East-West Trade Policy," called CoCom for short. This tiny but powerful authority regulates what the Western Europeans and the Japanese are allowed to export to the CEMA area. Its decisions are tacitly accepted by the national governments: in times of slackening global tension the embargo is applied more casually, in periods of confrontation the reins are pulled tight.

In Europe only the neutral countries, Switzerland, Austria, Sweden and Finland, are not represented in CoCom. But they also respect the limits drawn by Washington. If it comes to the attention of the Americans that certain consignments that were bought, for example, by the Swiss, continue their journey to Hungary or Bulgaria, Switzerland can be threatened with a delivery ban for equipment of this kind. Considering the predominance of the Americans in almost every high technology area, the partners are generally careful about the resale of installations to which they know the United States is opposed.

Points of contention within the capitalist camp arise when the delivery of technology is involved which can be used in both the civilian and military

areas. While it is clear that an antiaircraft weapon, such the American shoulder-fired heat-seeking rocket "Redeye," cannot be sold, bad feelings arise when, at first glance, the equipment is for peaceful purposes, for example when president Carter prohibited the US company Sperry from selling its large "Univa 1100" computer, which the Russians wanted to have for their computer center at the Olympic Games in Moscow in 1984. The computer was sold later anyway; in this instance the Europeans were unwilling to accept the embargo.

How complicated the topic is can be shown by the sale--which occurred almost without opposition--of two gigantic dry docks, whose construction would have been possible if the Soviets had used their own resources, only after several years of preliminary infrastructure work. This first dock went to Vladivostock in 1978 and has been in service since then with the Pacific fleet. The other one has been in Murmansk since 1981. It is an intergral part of the North Sea fleet (Atlantic).

The new carriers of the Kiev class (vertical take-off bases) can only be serviced in these two docks. And certainly the large carriers, which are the equal of the US units and which Moscow's fleet will presumably have ready at the beginning of the 1990s, can be serviced only in these two docks.

At the urging of the Americans, CoCom is presently engaged in bringing the embargo list up to date again--and enlarging it.

The transposition into German embargo rules takes place, as previously, through the Office for Commerce and Trade, which has its head office in Eschborn; there the exporters have to apply for their export permits. The customs service is responsible for checking.

There are many reasons why a grey veil covers the entire mechanism:

--the economic interests of the individual nations differ;
--the national industries want to export, while the military is asking for sealing off, and finally, but not last,
--Western industrial firms do not want to reveal their hands.

On the whole it can be said that trade in advanced technology in domestic markets is generally open; in the case of a border crossing, particularly with a delivery from the United States into another Western country it is subject to certain controls, and in the case of not expressly approved penetration of the Iron Curtain it becomes punishable.

The Activities of Commodore Dieter Gerhart

The containers in Hälsinborg, which were seized on 21 November, and the cases that went with them holding the software, which were tracked down subsequently and this week in Malmö and Stockholm by Swedish customs, give an insight into a worldwide scenario such as has not been possible so clearly until now.

The story of the VAX computer, or computers, is more fantastic than one John le Carre could have thought up. Originally, Digital Equipment Corporation in the United States shipped two of these systems, legally declared and passed, destined for the South African naval base at Simonstown. The containers arrived there to be sure, but they were reloaded under circumstances that are still not clear. They were soon sailing on the "Elgaren" destined for Hamburg, now with new papers which showed a new selling company and a new receiving company; both of them--"Optronix" in Cape Town and "Integrated Time" in Lucerne--belonged to Mr Mueller.

The shipment was supposed to continue its journey from the Elbe harbor through Sweden to a Soviet Baltic port. In the mean time the Americans had been alerted by the South Africans. Minutes before the "Elgaren" sailed from Hamburg German and US customs officials went on board. However, the hastily obtained court order for confiscation pertained to only one of the VAX 11/782s. The other one floated away, to Hälsinborg.

The redeclaration in Simonstown was clearly connected with the activities of a commodore Dieter Gerhardt, deputy chief of the naval base until his arrest. In October Gerhardt had been accused of espionage. He can receive the death sentence, the sentence will be handed down in the next few days. It had come out in the closed proceedings that Gerhardt was working under orders from Mueller.

Richard Mueller, although he has been a permanent resident for only a short time, is not an unknown in South African society. He has resided temporarily since 1980 and permanently since December 1982 in elegant Cape Town--and lived in the style a James Bond fan imagines for a top agent.

First, for 300,000 rand, he purchased the house of Barbara Barnard, the divorced wife of heart surgeon Barnard--as a temporary domicile. At the same time he had his eye on a suitable residence: Buitenverwachting, one of the five historical vineyards on the Cape. The price at the time: 2 million rand. He enlarged the property with an adjoining farm and with parts of the neighboring property "Husseys Vlei," so that the total piece, with 110 hectares, ranked only just behind the world-famed "Groot Constantia." He started a five-year program: modernizing operations and restoring the historical buildings. In 1982 he built a luxurious country house for his family and himself on the property. He got rid of the Barnard Villa.

Into the late fall of 1982, Mueller had already proved his talent for making money and motivating people in Jesteburg, south of Hamburg. If he devoted himself to viniculture in Cape Province, he had been engaged in horse breeding in Lower Saxony. His stable of Trakehner horses enjoyed international fame.

Economic miracles had happened to Mueller in the south of Hamburg. He turned up in Jesteburg in the mid 1970s, just over the age of 30, and moved into a small single-family house. He immediately began construction of a thatched country house, valued at DM 10 million. On the side he was developing his Trakehner stud farm "Wiedenhof." He owned two Rolls-Royces, a Mercedes 500, a Porsche and a squad of servants. He had walls, barbed wire and hedges put up around the large property.

The fame of the treasures and money of the new citizen of Jesteburg did not reach the ears of the normally alert authorities, but it did reach those of an almost bankrupt manufacturer of electronic organs in the little Euelenspiegel town of Moelln. Roland Waidhas and his friends had overextended themselves financially. Bankruptcy was to be declared on a Monday in May 1982. On the Sunday one of the partners, Gerhard Schaal, drove to Jesteburg of an off-chance. He actually met the horse breeder--and an hour later he left him with an open check for DM 50,000.

One week later the Gerland Orgelwerke GmbH belonged to the Richard Mueller group of international companies. The home organs from Moellen began to play atonal pieces. In the fall the musical instruments were put aside.

Mueller arrived with a few people and half a dozen trucks. The organ factory was fulled with computers, VAX 11/780s, still in the original boxes of the Digital Equipment Corporation. This type may also not be exported to Warsaw Pact countries according to the US regulations (Export Administration Act); it is entered on CoCom's embargo list under number 1565. In Moelln the computers were repacked in neutral crates and the original boxes were destroyed.

On the evening of 29 October 1982 the first of 5 Hungarian heavy trucks rolled into the Gerland yard. The trucks were from the "Hungarocamion" moving company in Budapest. The shipping papers now read: "air conditioners," "office furniture," "PVC film," "lighting fixtures with accessories"; the Mueller company ""Technimex Import und Export GmbH, D 2101 Harmsdorf" was acting as the shipper. The explosive computers went past the customs officials at Helmstedt into the GDR.

Constantly New Zig-Zag Routes

This Richard Mueller, who subsequently delivered a complete computer center--from the computer to the air-conditioning and the fire extinguishers--by way of the organ builders in Moelln to the Soviet Union, has been known to the Americans since 1974. He has funnelled volatile equipment along constantly new zig-zag routes into the East through his companies, which are always changing their location, in the United States and Canada, in the FRG and Switzerland: computers, entire guidance systems, semiconductor fittings.

During the years, such companies continually went out of business. Mueller dissolved firms, had new ones registered, disappeared and in the FRG he was safe from deportation.

It was not until the Moelln episode with the forged shipping papers that he was in any danger in this country. In December 1982 he threw a splendid farewell party and disappeared with his wife and children.

On the Cape of Good Hope he was officially tending his grapes. In actuality he was spiriting the two VAX 11/782 computers out of the South African naval base.

When Christina Mueller was asked in the last days of November by South African reporters in Cape Town about her husband's whereabouts, she parried any questions: "I am shocked, my husband has been in Germany--for weeks."

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